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RELAPSING FEVER AND OTHER SPIROCHAETOSES.

ROSENHOLZ (H. P.). Die Rolle der Wanzen in der Epidemiologie des Rückfallfiebers. [**The Rôle of the Bug in the Epidemiology of Relapsing Fever.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Apr. 12. Vol. 102. No. 4–5. pp. 179–213. With 3 text figs. [48 refs.] [Educ. Commissariat, R.S.F.S.R., Moscow.]

The paper gives an account of what appear to be very carefully conducted experiments on the behaviour of relapsing fever spirochaetes in bed bugs, and the part played by these insects in the transmission of the disease. The method of handling, keeping, feeding and inoculating the bugs is given, together with most relevant historical data. The outcome of the enquiry is that, as in the case of the louse, in a certain percentage of bugs, within a few minutes of their ingestion of infected blood, some of the spirochaetes commence to make their way to the haemocoele where they multiply and persist in virulent form for long periods, probably for the remainder of the bug's life. Contamination of the slightest lesion of the skin with haemolymph from damaged or crushed bugs is able to cause infection.

With regard to the persistence and virulence of spirochaetes in bugs, most of the earlier references are given. It is noted that the observation of KARLINSKY, 1902 (*Cent. f. Bakt.* I.Abt. Orig. Vol. 31, p. 566), of the presence of living spirochaetes in bugs 30 days after feeding on infected blood has usually escaped recognition. [No mention, however, is made of the reviewer's observation of living spirochaetes for 20 days (G. V. SMITH, "On some cases of relapsing fever in Egypt and the question of carriage by domestic vermin." London, 1909), nor of DUNN's experiments (1923), which showed that animals could be infected by the injection of crushed bugs 32 days after feeding, and that stained films of the coelomic fluid showed spirochaetes up to 15 days (this *Bulletin*, Vol. 20, p. 877).]

The spirochaetes with which the author conducted his experiments were *Treponema duttoni* and *T. recurrentis*.

The first question to determine was the length of time spirochaetes could persist in bugs without any reference to the different parts of the body. Batches of bugs were fed on infected mice and at varying intervals were crushed, the emulsion resulting from a number of bugs being injected into one mouse. In the case of *T. duttoni* it was found that the emulsion of bugs kept at a temperature varying from 13° to 24° C. infected mice up to 59 days. Taking the 5 to 59 day batches it was found that only 6 per cent. of the bugs harboured infective spirochaetes. In the case of *T. recurrentis* similar results were obtained.

Investigating the stomach contents, it was found that in the case of *T. duttoni* the spirochaetes remained alive and virulent for 48 hours. After this, motionless forms began to appear till finally all spirochaetes present were non-motile, faintly staining and non-infective. In about 5 days the stomach was almost free from recognizable spirochaetes. Though the spirochaetes begin to lose their motility after 48 hours there is not immediately a loss in virulence, for animals may still be infected with them. On the 3rd and 4th days, however, the virulence decreases in relation to the number of motionless forms present. Similar experiments were conducted with *T. recurrentis*, the strain of which was more virulent for mice. In this case the bugs were kept at a uniform temperature of 23°–24° C. The spirochaetes behave like *T. duttoni*, but they disappear more slowly, for even as late as the 8th or 9th day large numbers of motionless forms may be still present.

Fluid from the haemocoele was examined by amputation of a limb, antenna or other appendage. Both *T. duttoni* and *T. recurrentis* commence to make their way to the haemocoele from the stomach within a few minutes of their ingestion, but not in all bugs. In the case of the former spirochaete it occurs in 10 to 12 per cent. of the bugs, and in the case of the latter in 15 to 30 per cent. The haemolymph is a very favourable medium, for the spirochaetes become numerous in it in 48 hours and they persist there for long periods, even as much as five months. It is evident they occur in all the parts of the body in which the haemolymph occurs. As many as 100 spirochaetes may be seen in each field of the microscope. The application to very small lesions on the skin of mice of drops of the fluid containing spirochaetes leads to infection. The virulence of these spirochaetes has been proved to persist for 62 days, the longest interval tested. Working with larvae of the first stage, similar results were obtained, so that it is evident that all stages of the bug may become infected in a similar manner.

As regards the spirochaetes in the stomach of the bugs, they lose their motility, become agglomerated into masses and disentegrate, at first into largish then into small portions showing 2 or 3 turns. The breaking up of *T. duttoni* is complete in 4 or 5 days, but in the case of *T. recurrentis* it is slower. These degenerate forms are not capable of infecting mice. It is the spirochaete stage which enters the haemocoele and which produces infection. There is no reason to suppose that a granule phase or any other than that of the spirochaete takes part in the life history of the organism.

Apart from infecting bugs by feeding them on infected mice, the spirochaetes were introduced directly into the haemocoele by inoculation through the cuticle. It was found that spirochaetes introduced in this way multiplied like those which had made their way from the intestine. The technique of inoculating bugs is described.

It seemed advisable to compare the spirochaetes which developed in the haemocoele with those in the mice by serological methods. The one adopted was the thrombocytobarin test, which demonstrated conclusively that the two strains were identical.

Having discovered the spirochaetes in the haemocoele and their long persistence there, it became necessary to discover by what means bugs were able to convey infection in nature. The collected faeces of numbers of infected bugs at varying intervals after their infective feed were examined by the dark field, but on no occasion could anything resembling a spirochaete be found. Furthermore, attempts to infect mice with such faeces invariably failed. Similarly infected bugs were not able to infect mice by their bites. It is concluded that bugs are unable to convey infection by biting human beings, or by contaminating wounds with their faeces. As in the case of the louse, the fluid which exudes from damaged appendages is highly infective when it comes into contact with lesions in the skin, lesions which may be so minute as to be invisible to the naked eye. It would seem, therefore, that the damage of adult bugs leading to exudation of the haemolymph on to the skin, or the crushing on the skin of the very delicate larvae, would in the case of human beings lead to infection. The exact part played by bugs in the natural transmission of relapsing fever has to be investigated in the light of the experimental data now available. The louse, on account of its close association with man, is a more efficient vector, but on the other hand the bug lives longer and would serve as a better reservoir for the virus.

C. M. Wenyon.

Riding (D.) & Macdowell (T. W.). **Preliminary Notes on Relapsing Fever in the Anglo-Egyptian Sudan.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 524–529. With 1 map in text & 2 figs. on 1 plate.

An outbreak of relapsing fever in Western Dafur was studied by the authors, who saw 90 cases during November and December 1926. They suggest that the epidemic originated from an endemic focus in the Marra Mountains region and spread south-westwards to Zalingei and thence along the Wadi Azum. The disease was of 3 types—acute fulminating with death in 48 hours, ordinary severe with heavy mortality and prolonged convalescence in the survivors, and mild ambulatory. The disease appeared to be louse borne and examination of the coelomic fluid of these insects revealed spirochaetes which, however, were shorter than those in the blood of the patients.

C. M. W.

Donaldson (A. W. H.). **Report on Relapsing Fever at Oadweina.**—*Somaliland Protectorate Ann. Med. & San. Rep. for Year ending 31st December, 1925.* pp. 29–32.

An investigation into an epidemic at Oadweina in Somaliland revealed the fact that it was relapsing fever of the African type and was probably transmitted by *Ornithodorus moubata*. The disease has not been known there before and appears to have been brought from Hargeisa. Its spread to Oadweina causes apprehension and suggests a possibility of a further extension to Berato, El Huma, Burao and elsewhere.

C. M. W.

PAMPANA (E. J.). **Colombian Relapsing Fever simulating Acute Appendicitis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. Vol. 20. Nos. 5 & 6. pp. 357–358.

Two cases of relapsing fever showing symptoms very suggestive of appendicitis are described. Both were treated with neosalvarsan, which caused the disappearance of all the symptoms. The author thinks it possible that some of his previous cases which came to the operation table without revealing any abnormality of the appendix may have been of the same type. He suggests that the symptoms may be due to a spastic condition of some segment of the bowel.

C. M. W.

GUILLET (R.). Au sujet de la récente épidémie de dengue à Dakar. Note sur un cas de spirochétose humaine. [**Case of Human Spirochaetosis at Dakar seen in an Epidemic of Dengue.**]—*Bull. Soc. Path. Exot.* 1926. Nov. 10. Vol. 19. No. 9. pp. 860–862. [6 refs.]

During the course of an epidemic of dengue at Dakar a European woman was taken ill with what was at first thought to be this disease. In this case there was a relapsing type of fever, the patient becoming very ill. When seen by the writer 25 days after the commencement of the illness there was no fever, but a blood film revealed fairly numerous spirochaetes which did not resemble those of relapsing fever, no cases of which were being noted there. The organism was inoculated to mice and was maintained in them. It resembled and behaved like *Spirochaeta crocidurae* and in the absence of any cases of relapsing fever it is suggested that the case may be one of infection with this organism, transmitted by a mosquito. There are no Ornithodorus at Dakar, while the patient emphatically declared she had not seen a louse. The illness responded to treatment with acetylarsan.

C. M. W.

VIALATTE (Ch.). Troubles nerveux tardifs à la suite de la fièvre récurrente. [**Late Nervous Symptoms in Relapsing Fever.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Mar. Vol. 4. No. 1. pp. 56–60. [9 refs.]

Within five days of recovery from relapsing fever treated by an injection of novarsenobenzol a patient began to show symptoms referable to some change in the central nervous system. These increased in intensity for four days, and then remained stationary for the same period, after which gradual recovery occurred. It is concluded that the symptoms were due to invasion of the central nervous system by the spirochaetes.

C. M. W.

LE GAC. Coma apoplectique observé dans un cas de typhus récurrent. [**Apoplectic Coma in a Case of Relapsing Fever.**]—*Ann. de Méd. et de Pharm. Colon.* 1926. Oct.–Nov.–Dec. Vol. 24. No. 4. pp. 588–590.

A record of a case of relapsing fever at Ouadaï, near Lake Chad, in which acute symptoms resembling the apoplectic coma of cerebral haemorrhage supervened. Treatment by intravenous injections of novarsenobenzol brought about rapid recovery.

C. M. W.

HOFMANN (Adolf). Die experimentelle Therapie der Mäuserekurrens durch "Albert 102." [**Experimental Treatment of Relapsing Fever in Mice by Albert 102.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Apr. Vol. 31. No. 4. pp. 182–191. [7 refs.]

The author has tested the curative action of "Albert 102" on mice infected with relapsing fever spirochaetes. The ordinary course of the infection is for the spirochaetes to disappear from the blood in 4 or 5 days and to reappear in 3–5 days. The first relapse lasts 2–3 days. Thereafter other shorter and milder relapses occur. This relapsing infection occurs in about 25 per cent. of animals only, 75 per cent. dying at the height of the first attack. The animals were treated 24 hours after injection and were carefully watched for 60 days, after which they were reinoculated with spirochaetes to discover whether they were non-immune owing to the complete disappearance of spirochaetes after treatment. It was found that the minimal efficacious dose of "Albert 102" was 0·02 gm. per kilo of mouse. Such treated animals in most cases ceased to have spirochaetes in the blood in 24 hours. After their disappearance there was no return during the 60 days' observation when it was found that the animals could be reinfected. Compared with various salvarsan compounds it was found that "Albert 102" gave the best results, so that the author is led to believe that it might play a part in the combat of the human disease.

C. M. W.

KRITSCHEWSKI (J. L.). Ueber die Salvarsanfestigkeit der Recurrensspirochäten. [**Salvarsan Susceptibility of Relapsing Fever Spirochaetes.**]—*Klin. Woch.* 1927. Mar. 5. Vol. 6. No. 10. pp. 441–445. [9 refs.]

Working with 7 different strains of relapsing fever spirochaete in mice the author has found that there is considerable variation as regards their susceptibility to therapeutic doses of salvarsan. It is evident, therefore, that in testing the therapeutic efficiency of drugs this fact should be taken into account and that it is very desirable that a further effort should be made towards a solution of the problem of the chemotherapy of spirochaete infections, salvarsan not necessarily being the final word.

C. M. W.

KRITSCHEWSKY (L. W.). Ueber die sterilisierende Fähigkeit des Salvarsans im Bezug zu den Spirochäten. [**Sterilizing Capacity of Salvarsan for Spirochaetes.**]—*Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1926. Vol. 2. German summary p. 227. [In Russian pp. 220–227. 3 refs.]

Salvarsan, even in doses near the toxic limit, is unable to bring about complete sterilization of all mice infected with relapsing fever spirochaetes. Reduction of the dose of virus or treatment at early stages of the infection does not lead to a point when it can be said that all the animals have been freed of their infection.

C. M. W.

KRITSCHEWSKI (J. L.) & BRUSSIN (A. M.). Das provozierte Rezidiv, die Superinfektion und die Reinfektion beim Recurrens. [**Provoked Relapse, Superinfection and Reinfection in Relapsing Fever.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1926. Nov. 8. Vol. 49. No. 1–2. pp. 180–198. [19 refs.]; also in *Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1926. Vol. 2. German summary p. 186. [In Russian pp. 170–186. 19 refs.]

The results of reinoculating mice which have already suffered from a relapsing fever infection may be actual reinfection, superinfection or provocation of a still persisting infection. If reinfection is judged to have taken place then it must have been established beyond doubt that the original infection has been entirely eliminated. The conclusion of EHRLICH and HATA that if after reinoculation spirochaetes appear in the blood then the animal must have been entirely rid of its original infection is invalidated by the possibility of superinfection and provocative infection. Even the brain test of BUSCHKE and KROÓ only gives information when the animals inoculated with the brain substance of apparently recovered animals become infected. In other words definite information of a persisting infection is given by a positive result while a negative one does not entirely exclude a persisting infection. It is evident, therefore, that there is considerable difficulty in deciding definitely whether an animal is entirely free from the organisms which gave rise to an infection from which it has apparently recovered. By combining the serological tests involving the presence of thrombocytobarin and the brain test it is concluded that superinfections can be produced.

C. M. W.

BRUSSIN (A. M.). Ueber eine neue Immunitätsreaktion bei experimentellen Rückfallfieber. [**A New Immunity Reaction in Experimental Relapsing Fever.**]—*Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1926. Vol. 2. German summary p. 51. [In Russian pp. 36–51. With 2 text figs. 8 refs.]

The specific substance termed thrombocytobarin appears in mice infected with relapsing fever spirochaetes one or two days after the crisis, whether naturally occurring or artificially produced by treatment. The reaction is so specific that first attack and relapse strains of spirochaetes can be distinguished. As a test of infection the reaction is likely to be of value for diagnostic purposes and for the differentiation of spirochaetes and the study of immunity.

C. M. W.

STREMPEL (Rudolf) & ARMUZZI (Giuseppe). Immunitätsstudien bei dem experimentellen Rückfallfieber der Maus. [**Studies on Immunity in Experimental Relapsing Fever in Mice.**]—*Klin. Woch.* 1927. Jan. 8. Vol. 6. No. 2. pp. 62–64. [7 refs.]

A long paper on relapsing fever immunity of mice. It is noted that the persistence of spirochaetes in the brain of immune mice is an exceptional and transitory phenomenon. These persisting spirochaetes are in no way resistant to the antibodies in the serum. Mice which have been infected by intraperitoneal inoculation and have become

immune to further infection by this method of inoculation may in many cases be reinfected (superinfection) by subcutaneous inoculation. There is no passage of spirochaetes or immune substances through the placenta of mice.

C. M. W.

STREMPEL (Rudolf) & ARMUZZI (Giuseppe). Studien ueber das experimentelle Rückfallfieber. Die Beziehungen der Recurrensspirochäte zum Gewebe. [**Experimental Relapsing Fever. Relation of the Spirochaetes to the Tissues.**]—*Klin. Woch.* 1927. Jan. 29. Vol. 6. No. 5. pp. 200–204. [12 refs.]

An investigation into the relation of the spirochaetes to the cells of the body in relapsing fever in mice has shown that the organisms are capable of actively penetrating various tissue cells which do not exhibit any phagocytic action. Degenerated forms of the spirochaete were seen in red blood corpuscles and phagocytes of the spleen as also in liver cells. The brain parenchyma contains spirochaetes at all stages of the infection, but their presence there in the immune period is only demonstrable by inoculation of brain substance into other mice. The spirochaetes do not appear to produce any noticeable histological changes in the brain.

C. M. W.

BRUYNOGHE (R.) & COLLON (N.). Le blocage du système réticulo-endothélial dans l'infection récurrente. [**Blocking of the Reticulo-Endothelial System in Relapsing Fever.**]—*C. R. Soc. Biol.* 1927. Jan. 28. Vol. 96. No. 3. pp. 213–214. [4 refs.]

With a view to testing the function of the reticulo-endothelial system in the production of lysis in experimental relapsing fever in mice a series of these animals was given on three successive days a subcutaneous dose of 0·2 cc. of a 1 per cent. solution of trypan blue. Five animals which survived this treatment were then inoculated with *Treponema duttoni*. In 4 of them and in the controls the infection ran the same course, there being 2 relapses. One of the animals died at the first attack, but this was thought by the author to be a delayed death resulting from the trypan blue. However this may be, it is clear that in the 4 survivors the blocking of the reticulo-endothelial system did not influence the production of lysis. Attempts to block the system with pig serum were also made. Mice infected with the spirochaete were given daily a dose of 0·5 cc. of pig or human serum. Though the pig serum is supposed to have an inhibiting action on the production of antibodies all the animals showed a more intense infection than the controls.

C. M. W.

VINZENT (René). Spirochétose de la souris blanche et infection mixte trypano-spirochétique. [**Spirochaetosis of the White Mouse and Mixed Trypanosome-Spirochaete Infection.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 131–147. With 8 graphs. [18 refs.]

The sudden appearance in mice during the course of certain trypanosome experiments of a spirochaete of the relapsing fever type has already been noted (*ante*, p. 86). It is pointed out that the spirochaete

cannot have owed its presence to an accidental laboratory infection, for the mice were new ones from the Institute of Strassburg, where no strains of spirochaete were being kept. Furthermore the spirochaete appeared in only one of six mice inoculated from another one, which was infected with *Trypanosoma somaliense* and which died in the usual way. Subsequent experiments have shown that if a mouse is inoculated with the trypanosome and spirochaete at the same time the spirochaete appears in the blood first and as it disappears the trypanosomes increase in number up to the death of the animal. This course is of regular occurrence in dually inoculated animals. In the mouse in which the spirochaete was first found it occurred in great numbers in the blood at the moment of the death of the animal 22 days after the trypanosomes had been inoculated. The author does not believe that the spirochaete had an intestinal origin in the mouse in question. He appears to hold the view that there was a latent infection which was lighted up by the trypanosomes. The spirochaete has been shown to be inoculable to man. A general paralysis case after inoculation by scarification showed spirochaetes in his blood on the sixth day. The infection lasted 72 hours during which there was a febrile reaction, the highest temperature noted being 39·5° C. At the height of the infection there were 4 to 5 spirochaetes per field of the microscope. There was no relapse.

The influence of the spirochaete infection on the *Trypanosoma somaliense* infection of mice was carefully studied. This was rendered possible because of the marked uniformity of the spirochaetal infection in mice as also that of the trypanosome. In young rats and mice whatever method of inoculation be adopted the spirochaetes appear in the blood in 3 days ; they increase up to the 6th day, when 5 to 6 are seen in each field. They disappear but return at intervals of 4 to 6 days up to the 21st day. The trypanosome infection first shows itself in 2 to 5 days according to the dose of virus. There is then a regular increase in the trypanosomes leading to the death of the animal on the 5th to 9th day. If the animals are inoculated with trypanosomes and spirochaetes simultaneously the infection occurs in three stages. The first lasts 8 to 9 days and represents the incubation period and the first appearance of parasites. Both parasites appear at the usual time, but instead of rapidly increasing in number the trypanosomes multiply slowly and then at about the 6th day become very difficult to find. This disappearance of trypanosomes is followed by an increase in the spirochaetes and the second stage of 15 to 20 days is initiated. During this stage the spirochaetes appear and disappear successively from the blood, the trypanosomes remaining very scanty and difficult to detect. At the end of this stage the trypanosomes begin to increase in numbers as they do in the unmixed infection and lead to the death of the animal on the 30th to 40th day. Spirochaetes may or may not be present during this stage. There is thus a definite antagonism between the two infections, but the author does not believe that such exists between the two parasites. He thinks that the changes in the host brought about by the spirochaetes, one of which is a marked mononuclear increase during its presence, render it less favourable to development of the trypanosomes. At the time that the trypanosomes multiply rapidly at the third stage the mononuclears decrease in number. It is suggested that some mechanism of the sort occurs in the inoculation treatment of general paralysis.

C. M. W.

NICOLAU (S.). Syphilis et fièvre récurrente. [**Syphilis and Relapsing Fever.**]—*C.R. Soc. Biol.* 1927. Jan. 14. Vol. 96. No. 1. pp. 36–38. [2 refs.]

Inoculation of relapsing fever spirochaetes or *Spirochaeta crocidurae* into the actual lesions or into the veins of rabbits suffering from experimental syphilis does not modify in any way the course of the syphilitic infection. There is thus no antagonism between the spirochaetes. Inoculation of rabbits with relapsing fever spirochaetes does not give rise to severe fever as it does in man, so that this factor is not present to influence the disease. C. M. W.

i. BRUYNOGHE (R.), DE GREEF (Et.) & DUBOIS (A.). L'hémoculture dans la fièvre récurrente humaine. [**Blood Culture and Serological Researches in Human Relapsing Fever.**]—*C.R. Soc. Biol.* 1927. Apr 26. Vol. 96. No. 13. pp. 1071–1072. [1 ref.]

ii. ——,—— & ——. Recherches sérologiques dans la fièvre récurrente humaine.—*Ibid.* pp. 1073–1074. [1 ref.]

i. In a medium similar to that described by GALLOWAY (this *Bulletin* Vol. 23, p. 111) the authors have cultivated the relapsing fever spirochaete from human blood.

Narrow tubes, in the bottom of each of which is placed some egg albumin, are revolved in the water bath till each is lined by a thin layer of coagulated albumin. Into each tube is introduced rabbit serum, diluted 1 in 5 to 1 in 8 with Ringer's solution (glucose 1 ; NaCl 9 ; KCl 0·42 ; $CaCl_2$ 0·24 ; $NaHCO_3$ 0·10 ; distilled water 1,000). The contents of the tubes are then covered with a layer of sterile vaseline and heated in the water bath at 56° C. for 1 hour. In this medium inoculated with infected blood by means of a long pipette the spirochaetes grow well at a temperature of 36°–37° C. The maximum growth is reached on the 8th to 10th day. In all cases when spirochaetes could be seen in the blood culture was obtained and also in cases when no spirochaetes could be detected. The authors believe that the method can be employed for diagnostic purposes. Subcultures can be made as late as the 15th day, but before inoculating the tubes it is necessary to add red blood corpuscles, in the shape of a drop of mouse, rabbit or human blood. Red blood corpuscles occur of course in the primary culture and the authors state that they are necessary for the growth of the organisms.

ii. In the second paper the authors give some details of experiments designed to test the agglutinating analytic action of the serum of relapsing fever convalescents on the cultural spirochaetes. They were not able to demonstrate the presence of substances acting in this way. Attempts to obtain fixation of alexine by the spirochaetes gave irregular results, while no evidence was obtained that the serum of convalescents gave a Wassermann reaction with an antigen of the cultural forms of the relapsing fever spirochaete. C. M. W.

HOELTZER (R.) & ZABOLOTZKAJA (T.). Vergleichendes Studium der Kultivierungsmethoden der *Spirochaeta Obermeieri.* [**Comparative Study of Methods of Cultivation of** *S. obermeieri.*]—*Cent. f. Bakt.* I. Abt. Orig. 1926. Nov. 26. Vol. 100. No. 7–8. pp. 306–310. [1 ref.]

The authors have made a comparative study of various methods which have been recommended for the cultivation of the relapsing fever spirochaete. The organism was inoculated directly from the blood

of man into the culture media. It was found that the medium of ARISTOWSKY and Hoeltzer (this *Bulletin*, Vol. 22, p. 712) gave the best result. It was also noted again that the serum of one horse may be more suitable than that of another. In the present series of experiments the sera of two horses, B and W, were used. In medium prepared from serum of B it was possible to grow the spirochaete only in a few cases, whereas with serum of W, success was obtained in all cases but one, which was that of a patient who had commenced salvarsan treatment. It was noted, however, that strains which failed to grow in medium prepared with B after inoculation directly from the patient, might in some cases grow in it after a few generations of culture with serum W. As regards methods of culture recommended by other observers it was found that none of them gave such good results as that of ARISTOWSKY and Hoeltzer.

C. M. W.

i. SCHREUS (H. Th.). Ueber die wechselseitige Beeinflussung von Rekurrens- und Naganaerregern. [**The Reciprocal Influence of Relapsing Fever and Nagana.**]—*Dermat. Woch.* 1926. Vol. 83. No. 52a (Ergänzungsheft) pp. 1885–1889. [9 refs.]

ii. JOSEPH (A.). Ueber die Beziehungen der Erreger bei der (exper.) kombinierten Rekurrens-Nagana-Infektion. Bemerkungen zu der Arbeit von H. Th. Schreus in Nr. 52a der Derm. W., 1926, Bd. 83.—*Ibid.* 1927. Apr. 9. Vol. 84. No. 15. p. 501.

SCHREUS (H. Th.). Zu vorstehender Bemerkung des Dr. A. Joseph.—*Ibid.* pp. 501–502.

i. In the first paper Schreus notes that in 1910 both TRAUTMANN and DAELS showed that a nagana infection of mice was altered by a concurrent relapsing fever infection, so that its usual acute course was changed to a chronic one during which trypanosomes disappeared from the blood at intervals. The author has confirmed and extended these observations.

ii. In the second paper Joseph draws attention to the fact that his published work (this *Bulletin*, Vol. 24, p. 81) was not taken into account by SCHREUS, who in the third paper replies that the experiments of Joseph were the reverse of his and were designed to test the influence of a trypanosome infection on a persisting spirochaete infection of the brain.

C. M. W.

JAHNEL (F.). Ueber das Vorkommen der *Spirochaeta Duttoni* im Hirngewebe des Menschen (Paralytikers) während der Rekurrensinfektion. [**Occurrence of** *S. duttoni* **in the Brain of a Paralytic during Relapsing Fever Infection.**]—*Muench. Med. Woch.* 1926. Nov. 26. Vol. 73. No. 48. pp. 2015–2016. With 1 text fig. [2 refs.]

Histological examination of the brain of a general paralytic who died during relapsing fever treatment, revealed the presence of relapsing fever spirochaetes in the tissues. Their distribution was similar to that described for *Treponema pallidum*.

CUNNINGHAM (J.) & THEODORE (J. H.). **A Form of Serological Mutation occurring in** *Spironema carteri.—Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 121–131. With 1 chart in text & 8 figs. on 1 plate.

The substance of this paper is the same as that previously reviewed (this *Bulletin*, Vol. 23, p. 112).

C. M. W.

ZEISS (H.). Die Bedeutung der Rückfallfieberspirochäte für die parasitologische Forschung. (Ein Gedenkblatt zum 50-ten Todestag Obermeiers.) **Significance of the Relapsing Fever Spirochaete for Parasitological Discovery.**] —*Arch. Russes de Protistologie.* 1925. Vol. 4. No. 3–4. pp. 289–295. With 1 text fig. [Russian summary pp. 295–296.]

An article written for the fiftieth anniversary of the death of OBERMEIER explaining how his discoveries, particularly that of the relapsing fever spirochaete, opened up new fields of research and led directly to most important and fruitful enquiries.

C. M. W.

SMITH (David T.). **Analysis of One Hundred Cases of Broncho-Pulmonary Spirochetosis.**—*New York State Jl. Med.* 1927. Feb. 1. Vol. 27. No. 3. pp. 119–122. With 1 text fig. [31 refs.]

——. **Bronchopulmonary Spirochetosis.**—*Amer. Rev. Tuberculosis.* 1927. Mar. Vol. 15. No. 3. pp. 352–372. With 2 text figs. [98 refs.]

These two papers deal with the same series of cases and form a most valuable contribution to the subject. The observations have been carefully conducted and a definite attempt has been made to obtain scientific evidence of the part played by spirochaetes in the pathology of the condition known as broncho-pulmonary spirochaetosis. [In this respect the paper differs from the vast majority which have been published on this subject, and which content themselves with dogmatic assertion unsupported by any reliable evidence.]

In the first place, the author concludes that there is a group of unrelated pulmonary conditions in which spirochaetes, fusiform bacilli and cocci are constantly present. It is generally assumed that the organisms are secondary invaders, but if this were so, one would expect to find them present in all forms of chronic pulmonary disease. However, repeated examinations failed to reveal them in 150 cases of uncomplicated pulmonary tuberculosis, 6 cases of bronchial asthma and 5 cases of mycotic infection of the lung. The spirochaetes, fusiform bacilli and cocci are identical with those commonly present in the mouth, which is probably the source of the pulmonary infection. This view is supported by the fact that pulmonary abscess and gangrene have been produced in mice, guineapigs and rabbits by intratracheal inoculations of material from the gums of patients suffering from severe pyorrhoea.

The cases studied are grouped in the following twelve categories, which show the protean nature of the condition. (1) Lung gangrene. (2) Lung abscess following tonsillectomy. (3) Lung abscess following extra-respiratory operations. (4) Lung abscess complicating neoplasms of the lung. (5) Lung abscess associated with foreign body in lung. (6) Primary or spontaneous lung abscess. (7) Unresolved pneumonias. (8) Acute bronchitis. (9) Bloody bronchitis. (10) Putrid bronchitis. (11) Chronic bronchiectasis. (12) Any of the above associated with pulmonary tuberculosis. To the varied nature of the pathological lesions in broncho-pulmonary spirochaetosis may be attributed the wide difference in the clinical manifestations. In

100 cases the symptoms are cough 95 per cent., expectoration 94 per cent., rales 63 per cent., foul sputum 62 per cent., fever 60 per cent., pleural pain 52 per cent., haemorrhage 50 per cent., foul breath 30 per cent., sputum in three layers 28 per cent., loss of weight 28 per cent., clubbed fingers 13 per cent., night sweats 12 per cent. With the exception of foul sputum, they conform to the prominent symptoms of pulmonary tuberculosis. Brain abscess and empyema are the two important complications. In all cases of empyema spirochaetes, fusiform bacilli and streptococci were found in the pus, while the pus from one of the three cases of brain abscess showed spirochaetes and fusiform bacilli. It is thought that broncial spirochaetosis may be the cause of primary bronchiectasis, for in the sputum of all of 12 cases spirochaetes, fusiform bacilli and cocci were found. As regards treatment spontaneous recovery occurred in a limited number of cases. The arsenical preparations were particularly helpful at times when employed early in the disease. When of six months' duration or longer no instance was seen in which the disease was cured.

The general conclusion is that broncho-pulmonary spirochaetosis is probably the result of aspiration, from the mouth into the lungs, of a group of anaerobic organisms including spirochaetes, fusiform bacilli, cocci and vibrios. No evidence is given as to the part played by these organisms individually.

C. M. W.

GATÉ (J.) & BILLA (M.). A propos des spirochétoses bronchiques (étude parasitologique de 32 cas). [**Bronchial Spirochaetosis. Parasitological Study of 32 Cases.**]—*C.R. Soc. Biol.* 1927. Feb. 4. Vol. 96. No. 4. pp. 284–287.

—— & ——. Contribution à l'étude des spirochétoses bronchiques ; à propos de 32 cas.—*Presse Méd.* 1927. Apr. 23. Vol. 35. No. 33. pp. 513–515. [21 refs.]

The clinical histories of 25 of a series of 32 cases of bronchial affection, showing spirochaetes in the sputum, revealed the fact that 8 were definitely tuberculous, the tubercle bacilli being found in 5, 12 were typical cases of acute bronchial spirochaetosis, while 5 were chronic bronchitics. Subcutaneous inoculation of guineapigs with sputum produced severe local abscess and necrosis, which killed the animals on the eighth day. As a rule, the spirochaetes were limited to the local lesion which contained other organisms also. In one case the spirochaetes were found in the peritoneal exudate. The spirochaete grows readily along with other organisms in dilute horse serum covered with oil. Very polymorphic in the sputum and guineapig lesions it becomes more uniform in culture, where it is seen as a fine spiral organism 15 to 20 μ in length.

C. M. W.

HUIZENGA (Lee S.). **Broncho-Spirochaetosis.**—*Nederl. Tijdschr. v. Geneesk.* 1927. Apr. 2. 71st Year. 1st Half. No. 14. pp. 1698–1704. With 1 text fig.

This is a long dissertation on bronchial spirochaetosis, the author's experience of which has been acquired in North China, where it is stated Kiangsu is a hot bed of the disease. The author writes that he had previously treated 166 cases at Nanking University, and that in the past year he had treated 345, of whom 65 had tubercle bacilli in the sputum.

[The paper adds little to our knowledge of the subject, but emphasizes the fact that spirochaetes occur very commonly in sputum in various pulmonary conditions, and that the ease with which they are demonstrated, and the assumption that they are the etiological factor in all the diseases in which they occur is largely responsible for the flood of uncritical literature on the subject.]

C. M. W.

MANSON-BAHR (Philip). **Is Bronchial Spirochaetosis a Distinct Clinical Entity ?**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. Vol. 20. Nos. 5 & 6. pp. 352–353. With 2 figs. on 1 plate.

The author expresses his disbelief in the existence of a clinical entity, bronchial spirochaetosis, and mentions in support of his conviction, two instructive cases, both of which before they came under his notice, had been diagnosed as this condition because of the presence of spirochaetes in the sputum. The first was a case of malignant disease of the lung, the second amoebic abscess of the liver with rupture of the abscess through the diaphragm. The first patient died, while the second was cured by appropriate treatment.

C. M. W.

PELLÉ (A.). Spirochétose broncho-pulmonaire chez les blessés du thorax par projectiles de guerre. [**Broncho-pulmonary Spirochaetosis in Persons wounded in the Thorax by Projectiles.**]—*Bull. et Mém. Soc. Méd. Hôpit de Paris.* 1926. Dec. 16. Year 42. 3rd Ser. Vol. 50. No. 38. pp. 1701–1704.

Four men who had retained since the war metallic fragments of projectiles in their lungs, suffered from cough associated with haemoptysis. Examination of the sputum recently showed that spirochaetes were present and the author's desire is to call attention to the association of the two conditions—presence of foreign bodies in the lungs and bronchial spirochaetosis.

C. M. W.

MENDELSON (Ralph W.). **Chronic Broncho-Spirochaetosis with Acute Exacerbation.**—*Jl. Trop. Med. & Hyg.* 1927. May 16. Vol. 30. No. 10. pp. 126–127. With 1 text fig. [4 refs.]

A woman who had had a cough for about a year, became more acutely ill with night sweats, and evening rises of temperature and cough with much expectoration. When seen three weeks after the onset of the acute condition, it was found that numerous spirochaetes occurred in the sputum. No tubercle bacilli could be found. After she had been put on Fowler's solution for 10 days it was difficult to obtain sputum, so improved was her condition. A sample obtained, however, showed spirochaetes reduced to 75 per cent. of their original number. Three weeks later she stated that she felt quite normal. The case is diagnosed as bronchial spirochaetosis and it is stated that without doubt many such cases are diagnosed as influenza.

C. M. W.

BACIGALUPO (Juan). Expectoración sanguinolenta y espiroquetosis. [**Bloody Sputum and Spirochaetosis.**]—*Semana Méd.* 1926. Dec. 23. Vol. 33. No. 51 (1719). pp. 1705–1707. [4 refs.]

——. Expectoration sanglante et spirochétose.—*C. R. Soc. Biol.* 1927. Apr. 1. Vol. 96. No. 12. pp. 895–896.

Examining 30 samples of blood-stained sputum spirochaetes were found in 9. Of these, 8 actually showed blood at the time of examination and 1

did not, though it was from a patient who had coughed up blood-stained sputum before. The spirochaetes were 4 to 17 microns in length and had 3 to 12 spirals, and as viewed by the dark field microscope were very polymorphic. The coincidence of the blood-stained sputum and the spirochaetes leads the author to attribute to them a pathogenic role.

C. M. W.

SCHLOSSMANN (C.). Recherches sur la spirochétose broncho-pulmonaire. [**Researches on Broncho-pulmonary Spirochaetosis.**]—*Presse Méd.* 1927. Feb. 12. Vol. 35. No. 13. pp. 195–198. [33 refs.]

A long article on bronchial spirochaetosis based chiefly on the work of others. It is concluded that the identity of the spirochaetes in this condition cannot be established till pure cultures are obtained.

MIRONESCO (Th.). Spirochétose bronchiale avec éruption cutanée. [**Bronchial Spirochaetosis with Skin Eruption.**]—*Bull. Acad. Méd.* 1927. May 10. Year 91. 3rd Ser. Vol. 97. No. 19. pp. 598–600.

A patient was admitted to hospital as a typhus suspect on account of an eruption on the body. It was found, however, that the blood-stained sputum coughed up by the patient contained numerous spirochaetes and fusiform bacilli. Treatment in hospital resulted in recovery in eighteen days. The eruption on the body subsided as the spirochaetes disappeared from the sputum.

VISHER (John W.). **Spirochetal Bronchitis. Report of a Case successfully treated with Arsphenamine.**—*Jl. Lab. & Clin. Med.* 1926. Oct. Vol. 12. No. 1. pp. 55–57. [2 refs.]; also in *Amer. Jl. Syph.* 1927. Jan. Vol. 11. No. 1. pp. 65–67. [2 refs.]

The paper describes a case of purulent bronchitis in which spirochaetes and fusiform bacilli appeared to be the etiological factor. Prompt recovery followed the administration of neoarsphenamin intravenously.

VITON (Juan José), CRUCIANI (Julio A.) & VIVOLI (Donato). Un nuevo caso de broncoespiroquetosis de Castellani. [**Fresh Case of Broncho-spirochaetosis.**]—*Semana Méd.* 1927. Jan. 6. Vol. 34. No. 1 (1721). pp. 6–10.

A case of bronchial spirochaetosis with haemoptysis successfully treated with neosalvarsan and lipiodol. The presence of tubercle bacilli and hydatid, which was suggested by the sanguineous expectoration, was excluded.

AMILCAR LUZURIAGA (P.) & BACIGALUPO (Juan). Un caso de broncoespiroquetosis de Castellani. [**Case of Bronchospirochaetosis.**]—*Semana Méd.* 1926. Nov. 11. Vol. 33. No. 45 (1713). pp. 1298–1300. With 3 text figs.

A description of a case of bronchial spirochaetosis in an Argentino. Subcutaneous inoculation of 2 guineapigs with sputum resulted in a local lesion in one of the animals and in it spirochaetes were demonstrated.

C. M. W.

SANARELLI (G.). Les spirochètes caecaux. [**Caecal Spirochaetes.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 1–44. With 33 figs. on 2 plates. [40 refs.]

——. Gli spirocheti cecali.—*Ann. d'Igiene.* 1927. Mar. Vol. 37. No. 3. pp. 125–160. With 33 figs. on 2 folding plates. [48 refs.]

This long but interesting paper records the results of experiments made with cultures of spirochaetes which were obtained on two occasions when the heart blood of guineapigs was inoculated into culture media with a view to the isolation of organisms that might have brought about

the death of the animals which had succumbed during attempts to habituate them to a life at high temperatures. In most cases it was found that the blood and organs had been invaded by coliform or other intestinal bacteria. On the two occasions referred to the medium appeared to remain sterile, but microscopic examination of a clot of blood in the tube revealed the presence of numerous spirochaetes. They were present in pure culture, and had evidently, like the bacteria, invaded the blood and organs from the intestine. The cultures were the starting point of a long series of investigations, this being the first occasion on which an intestinal spirochaete had been obtained in pure culture. It was most readily cultivated in defibrinated guineapig or rabbit blood, but it also grew readily in a variety of liquid media to which some blood had been added. Liquid media without blood was less favourable though growth occurred, while on the surface of solid media the spirochaetes quickly reverted to the coccus forms which, however, gave rise to spirochaetes again in more favourable media. In subcultures the forms which appeared first, were short organisms resembling the cholera vibrios. These increased in length till finally the delicate spirochaetes appeared. Sometimes forms like fusiform bacilli were present. The spirochaetes themselves varied considerably in length, forms measuring 100 microns being sometimes seen. The optimum temperature was 37° C. but growth occurred, though less rapidly, at lower temperatures. In media containing blood the spirochaetes produced melanin the method of identifying which is described in detail. Attempts to produce infection in animals did not lead to definite results. The predilection of the spirochaetes for blood throws light on the presence of these organisms in cases of haemoptysis and dysentery. It is generally agreed that in bronchial conditions, when blood is present in the sputum, the spirochaetes are most numerous, and that they become fewer or disappear when blood is no longer present. The same condition of affairs has been noted in dysentery. It would seem unreasonable to ascribe the presence of blood to the spirochaetes. The blood in these cases evidently acts as a good culture medium. The whole question of buccal, intestinal pulmonary and other similar spirochaetoses is discussed. The conclusion reached is that the spirochaetes are chiefly inoffensive commensals or symbionts, which may, when in contact with already damaged tissues and in the presence of other organisms of a proteolytic nature, acquire pathogenic properties and cease to be entirely inoffensive.

C. M. W.

GOMES (J. M.) & PESSÔA (S. B.). Um caso de dyarrhéa dysenteriforme grave provocadas por espirochetas. [**Dysenteric Diarrhoea provoked by Spirochaetes.**]—*Ann. Paulist. Med. e Cirurg.* 1926. Nov.–Dec. Year 14. Vol. 17. No. 11–12. pp. 167–169. With 4 text figs.

A man, 42 years of age, began to suffer with diarrhoea, abdominal pain and tenesmus on January 27th, 1926. This continued and the motions later contained blood. No amoebae were seen, but emetine was given, without any benefit. Antidysenteric serum produced severe urticaria, but no change in the intestinal condition. By the middle of March he was having 16 actions daily and was emaciated and exhausted. Another examination of the stools revealed ova of trichocephalus, no amoebae, but enormous numbers of spirochaetes. He was given treparsol (0·25 cgm. daily) and in a few days there was great improvement. He continued the

treparsol for 45 days and was then apparently cured. In mid October the dysenteric symptoms returned and again spirochaetes were found, this time together with larvae of *Strongyloides stercoralis*. The taking of treparsol was again followed by complete disappearance of spirochaetes and clearing up of the symptoms.

H. Harold Scott.

BROUGHTON-ALCOCK (W.). **A Spirochaetic Infection with Necrosis and Perforation of Ileum.**—*Proc. Roy. Soc. Med.* 1927. Mar. Vol. 20. No. 5. pp. 704–706 (Sect. Trop. Dis. & Parasit. pp. 22–24).

A case is described in which death presumably resulted from perforation of one of several ulcers which were found post mortem about five to six feet above the ileo-caecal valve. On section of one of these ulcers it was found that there was a spirochaetal infection of the tissues of the ulcer. A streptococcus was also present. The author inclines to the view that the spirochaetes were in some way responsible for the condition which led to the death of the patient.

C. M. W.

CEROUEIRA (Augusto). Modificação á technica de coloração do Treponema pallido e de outras espirillaceas. [**Staining of *T. pallidum* and other "Spirillaceae."**]—*Brasil-Medico.* 1927. Mar. 19. Vol. 41. No. 12. pp. 258–262. [30 refs.]

The author advocates the following modification of Hollande's method for staining spirochaetes.

1. Fix the film in absolute or 90 per cent. alcohol for one minute. 2. Pour off the alcohol and when dry cover with the modification of Hollande's solution (chemically pure tannic acid 5 gm., glacial acetic acid 4 cc., absolute or 90 per cent. alcohol 50 cc., distilled water 50 cc.); warm gently for 30 to 60 seconds till steam rises. 3. Wash rapidly in running water. 4. Pour on basic carbol fuchsin of Ziehl and again warm till steam rises for 10 to 20 seconds. 5. Wash and dry.

C. M. W.

YAKIMOFF (W. L.). Modifikation der Spirochätenimprägnation nach der Methode Fontana-Tribondeau. [**Modification of the Fontana-Tribondeau Method of Staining Spirochaetes.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Mar. 8. Vol. 102. No. 1–3. pp. 89–90.

The following fluid is used. Glacial acetic acid 2 gm., carbolic acid crystals 2 gm., formalin 2 gm., tannin 5 gm., alcohol 50 cc., distilled water 40 cc. Some of the fluid is heated to boiling point in a test tube and then poured on to the dry film, which is left till the liquid cools. It is then washed in water and treated with the ammonia silver nitrate (5 per cent.) solution.

C. M. W.

VERVOORT (H.). Pseudo-spirochaeten en zweepdraden. [**Pseudo-spirochaetes and Flagella.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 1. pp. 102–105. With 12 figs. on 3 plates. [9 refs.]

An illustrated article demonstrating the resemblance of detached bacterial flagella to spirochaetes and the need for recognition of this fact in identifying spiral organisms in culture media. (See NOGUCHI, this *Bulletin*, Vol. 23, p. 601).

C. M. W.

BACIGALUPO (Juan). Indice morfológico de identificación de las espiroquetas. [**Morphological Index of Spirochaete Identification.**]—*Semana Méd.* 1927. Jan. 13. Vol. 34. No. 2 (1722). pp. 84–85.

——. Indice morphologique d'identification des spirochètes.—*C.R. Soc. Biol.* 1927. Jan. 28. Vol. 96. No. 3. pp. 215–216.

The conclusion is reached that the morphological index described by FROILANO de MELLO for the identification of spirochaetes is of no practical value (see this *Bulletin*, Vol. 23, p. 115).

CATANEI (A.). Sur la durée de l'immunité dans la spirochétose expérimentale des oiseaux. [**Duration of Immunity in Experimental Spirochaetosis of Birds.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Mar. Vol. 4. No. 1. pp. 53–55. [1 ref.]

Inoculation of canaries with the *Spirochaeta gallinarum* leads to infection followed by recovery and an immunity which persists for at least 20 or 21 months. The immunity resulting from inoculation with a Brazilian or an Algerian strain protects the birds against infection with another Algerian strain.

C. M. W.

KRITSCHEWSKY (I. L.) & TSCHERIKOWER (R.). Das Beladungsphänomen in Bezug auf *Spir. icterogenes.*—*Arb. a. d. Microbiol. Inst. d. Volksunterrichtskomissariats.* 1926. Vol. 2. German summary p. 81. [In Russian pp. 74–81. Refs. in footnotes.] [v. this *Bulletin*, Vol. 23, p. 599.]

RAT-BITE FEVER.

FUTAKI (K.), TAKAKI (I.), TANIGUCHI (T.), OHSUMI (S.), ISHIWARA (K.) & OHTAWARA (T.). **Demonstration of the Spirochaeta causing Rat-Bite Fever.**—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 133–137.

The authors give an outline of the symptomatology of rat bite fever and a description of the organism with a view to justifying their name *Spirochaeta morsus muris* and their claim that it is a spirochaete and not a spirillum. In support of their contention they state that the organism is flexible, has only one (not more) flagellum at each end, is weakly refractile, has not the movements of a bacterium, has during division a long intermediary thread, becomes dissolved in 5 minutes by bile or 10 per cent. sodium taurocholate, produces alopecia and clouding of the cornea when injected into guineapigs in large doses and produces symptoms similar to those caused by undoubted spirochaetes. They conclude that the organism belongs to the genus *Treponema.*

C. M. Wenyon.

SOESILO (R.). **The Occurrence of** *Spirillum muris*, **var.** *morsus muris*, **Specific Cause of Rat-Bite Disease, in Rats at Batavia.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1926. Pt. 4. pp. 503–509. With 1 plate. [17 refs.]

The paper records a series of experiments made with a strain of *Spirillum minus* recovered from the blood of a *Mus rattus* in Weltevreden. Guineapigs, rats and mice were infected. Of 7 guineapigs bitten by 4 infected rats 3 died of the infection, while 3 guineapigs out of 4 which were bitten by infected mice contracted the infection. The morphology of the organism is described and this is in conformity with the accounts of other observers. It may be noted that a single flagellum or a bunch of flagella occurs at each end of the organism while flagella arising from the central part of the body were also seen. The author is definitely of the opinion that the organism is a spirillum.

C. M. W.

HARDY (T. L.) & SAVERY (H. Mearns). **A Case of Rat-Bite Fever.**—*Lancet.* 1927. Apr. 2. pp. 703–704. With 1 chart. [5 refs.]

A farmer who had been severely bitten by a rat became suddenly ill with headache, nausea, severe limb pains and weakness two months after the bite, the wound of which had completely healed. There was a faint blotchy erythematous rash. He quickly recovered but had a similar attack 8 days later and he continued to have these attacks every 8 days. They were not associated with any inflammation of the scar of the healed wound nor with adenitis. After the 7th attack he was given 0·3 gm. of novarsenobenzol. An 8th attack occurring 9 days later was similarly treated, after which there was no recurrence. In view of the clinical history and response to treatment the authors feel justified in making their diagnosis.

C. M. W.

CADBURY (Wm. W.). **Rat-Bite Fever in China.**—*China Med. Jl.* 1926. Dec. Vol. 40. No. 12. pp. 1204–1207. [11 refs.]

Two cases of rat-bite fever occurring in the vicinity of Canton showed typical symptoms and from both cases the causative spirillum was isolated. These appear to be the first properly diagnosed cases from China, though others showing the clinical picture of the disease have been noted previously.

C. M. W.

DA MATTA (Alfredo). Sodoquiose ou sodoku? [**Cases of Sodoku.**]—*Brazil-Medico.* 1926. Oct. 23. Year 40. Vol. 2. No. 17. pp. 233–235; also in *Sciencia Med.* 1926. Nov. 30. Vol. 4. No. 11. pp. 566–572.

A description of 2 cases of rat bite fever in one of which the diagnosis was confirmed by the discovery of spirilla in gland puncture material. Both responded to treatment with injections of 914.

GIGLIOLI (George). **Clinical Notes on a Case of Sodoku from Cat Bite in British Guiana.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 504–505.

The case was in a man 27 years of age. A single organism was found in blood taken from a recently appeared papule.

COSIMO (Basile Vito). Un caso di Sodoku nella Somalia Italiana. [**Case of Sodoku in Italian Somaliland.**]—*Ann. di Med. Nav. e Colon.* 1927. Mar.-Apr. Year 33 (Year 5). Vol. 1. No. 3–4. pp. 175–179. With 1 text fig.

Description of a case of rat bite fever in a native of Italian Somaliland. There was a short incubation period of 4 days. The causative organism was discovered in the primary lesion.

GERBASI (Michele). Contributo clinico ed etiologico alla conoscenza del sodoku. [**Case of Sodoku.**]—*Pediatria.* 1927. Feb. 1. Vol. 35. No. 3. pp. 139–146. With 1 coloured text fig. [19 refs.]

A detailed description of a case of rat bite fever in a child of 8 at Palermo. The causative organism was found in smears of an enlarged gland.

RUSSO (Vincenzo). Ancora un caso di Sodòku in Sicilia. [**Another Case of Sodoku in Sicily.**]—*Policlinico.* Sez. Prat. 1927. Jan. 3. Vol. 34. No. 1. pp. 8–9.

A case of rat bite fever in Sicily in which diagnosis was established by the finding of spirilla in smears from the lesion.

C. M. W.

INFECTIOUS JAUNDICE.

BUCHANAN (G.). **Spirochaetal Jaundice.**—*Med. Res. Council. Spec. Rep. Ser. No. 113.* 64 pp. With 5 figs. & 23 figs. on 13 plates. 1927. London: H.M.S.O. [4s.]

In a previous paper (this *Bulletin*, Vol. 22, p. 181) the author described the investigations carried out by him in connexion with an outbreak of infectious jaundice in certain Scottish mines. The present report gives a more detailed account of this outbreak and others subsequently investigated. It does not supply much new information, but serves as a useful record of the clinical and laboratory investigations which may be undertaken when occasion arises and of the methods of carrying them out. In addition, very useful historical summaries are given, as also a long list of references to the literature of the subject. Finally a series of plates, six of them coloured and made by the author himself, illustrate the jaundice and petechiae seen in a severe fatal form of the disease, the haemorrhages in the stomach, mesentery and glands of a human case, the appearance of the lesions in an opened up guineapig, leptospira in the kidney and urine of the rat and blood of the guineapig and the character of the growth of leptospira in culture media, etc. This very complete and instructive report should be in the hands of all those who are likely to have to deal with outbreaks of infectious jaundice or other diseases which may be due to leptospira infection.

C. M. Wenyon.

i. GALLOWAY (David J.). **Epidemic Jaundice** (*Leptospira ictero-haemorrhagiae*).—*Malayan Med. Jl.* 1926. Dec. Vol. 1. No. 4. pp. 1–5.

ii. MALAYAN MEDICAL JOURNAL. 1926. Dec. Vol. 1. No. 4. pp. 5–6. **Fonr More Cases of Leptospirosis.**

i. The first paper describes 5 cases of leptospiral jaundice in the Federated Malay States. Three of the cases were of the haemorrhagic type and terminated fatally. The haemorrhage was from the stomach, bowel or kidneys, while petechiae occurred on the skin. From 2 of these cases by inoculation of blood or urine into guineapigs, leptospira were recovered. The 4th and 5th cases belonged to another category, as the disease, though severe, was not accompanied by haemorrhages. The 4th case was that of a Japanese gentleman who after recovery left for Japan, where 2 months after the commencement of his illness leptospira were found in his urine. Six weeks after his return from Japan the daughter became ill, and showed symptoms similar to those which characterized her father's attack. The 5 cases illustrate the extreme variation in the severity of the disease of which there appear to be two main categories—the ictero-haemorrhagic and the simple icteric.

ii. The second paper describes 4 further cases. They were all of a mild type and did not show even jaundice. In all cases leptospira were recovered by inoculation of guineapigs. A number of other similar cases were seen, but as leptospira were not isolated they are not recorded. It is evident that leptospirosis is a common disease in the Malay States.

C. M. W.

KOUWENAAR (W.). **Spirochaetosis Febrilis, a Tropical Leptospirosis.**—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 159–178. With 3 figs.

The author gives a detailed account of the diseases of Deli in which leptospira have been found. Three are distinguished, viz., spirochaetosis febrilis simplex, fever cases without jaundice or haemoglobinuria; spirochaetosis febrilis cum ictero, fever cases accompanied by jaundice and more or less resembling Weil's disease; blackwater fever, fever cases attended with haemoglobinuria. The description is based on 58 cases of the first condition, 32 cases of the second and 1 of the third, in all of which leptospira could be demonstrated. The cultivation method of diagnosis has so far improved that now the organism can be isolated from the blood in more than 60 per cent. of the cases. Inoculation of guineapigs reveals leptospira in only a small percentage. Thus in a series of 13 cases this method was positive only twice. Taking all due precautions to avoid contamination leptospira were found in the urine of 69 per cent. of the first type of disease, in 85 per cent. of the second and not in the 1 case of the third type. The symptoms which may occur in the first two types are general body pains, fever, increased pulse rate, injected conjunctivae, rash, haemorrhages, digestive troubles, tenderness and enlargement of the liver, albuminuria, leucocytosis, adenitis. Apart from the jaundice the two types differ from one another chiefly in the general severity of the disease. In the mild cases the fever lasts for 2 to 15 days, while in the severe cases it is more irregular and relapse is likely to occur. All the symptoms noted are not necessarily present. Thus in the 58 cases of the first type the urine showed no albumin in 9, febrile albuminuria 25, severe nephritis 24. In 32 cases of the second type 8 showed febrile albuminuria and 24 true nephritis. It would thus appear that the first two types merge into one another, the second type, which closely resembles Weil's disease and has a mortality rate of 20 per cent., being a severe form of the first.

As regards the cases with haemoglobinuria 2 such were seen in the course of an epidemic of the first two types, but leptospira were found in only one of these. The cases correspond in many ways with the spirochaetosis febrilis cum ictero, with the exception that severe blood destruction occurs. The organism in all these conditions is the *Leptospira pyrogenes* of Vervoort. It appears in the blood during the first days of illness and disappears after about 6 days. It appears to select the liver as the chief object of its attack. At the end of the second week, destruction of the organisms commences in the body, some of them being excreted by the kidneys. The relation of the Deli leptospirosis to dengue and Japanese seven-day fever is considered. Whether it is actually Weil's disease is an open question which can only be decided by further observation. It is possible that in epidemics of Weil's disease, atypical cases without jaundice and with little or no pyrexia, have been overlooked. At present it appears best to regard the various forms of spirochaetosis febrilis as a distinct entity till its immunological relations to other leptospiroses have been determined.

C. M. W.

JORGE (Ricardo). Des ictères épidémiques. [**The Epidemic Jaundices.**] *Bull. Office Internat. d'Hyg. Publique.* 1926. Nov. Vol. 18. No. 11. pp. 1283–1294. [1 ref.]

The paper discusses the subject of infectious jaundice which it is pointed out is not necessarily due to leptospiral invasion, for there

is evidence that certain outbreaks are caused by organisms of the paratyphoid group. The symptomatology and epidemiology of leptospiral jaundice or Weil's disease is discussed in connexion with an epidemic which occurred in Portugal in 1914, before the causative leptospira had been discovered by the Japanese workers. There were noted at Setûbal between the end of August and the end of October, 30 cases of which 9 were fatal. A month later the disease appeared at Cezimbra where there were 7 cases, 1 of which was fatal. As regards infectious jaundice, the cases studied by SARRAILHÉ and CLUNET at Gallipoli during the war, and a similar series of cases investigated by CANTACUZÈNE in Roumania during the campaign of 1917 are mentioned. ANIGSTEIN, during the autumn of 1921, investigated an outbreak in Poland, the town of Rovno, where there occurred 250 cases in three months, being most heavily affected. No leptospira could be discovered, but of 67 cases diagnosed as epidemic jaundice, the blood of 57 gave positive agglutination for paratyphoid organisms, chiefly those of the *Bacillus aertrycke* type. The epidemic jaundice of paratyphoid origin is essentially a benign disease, there being no tendency to haemorrhage so characteristic of the more serious Weil's disease. There undoubtedly exists still another type of infectious jaundice the etiology of which is not at present understood. C. M. W.

WOLLENBERG (R. A. C.). **The Status and Relationships of Infectious (Epidemic) Jaundice in the United States.**—*Ann. Clin. Med.* 1926. Sept. Vol. 5. No. 3. pp. 297–304. [16 refs.]

The writer discusses various outbreaks of infectious or epidemic jaundice which have been reported in the United States. One noted by SYMMERS in 1920 from Bellevue Hospital involved 16 cases of acute haemorrhagic jaundice of which 9 died. Clinically and anatomically these cases resembled yellow fever and Weil's disease. Various other outbreaks, including that in New York State in the winter of 1921–22, in which over 700 cases were noted, were of a milder type. From one case reported by SAILER (1925) a guineapig was inoculated with the urine and was found to be passing leptospira in the urine two weeks later. In 1922 WADSWORTH and his co-workers reported the accidental infection of a laboratory worker with a culture of leptospira isolated from a rat [this *Bulletin*, Vol. 19, p. 561]. In the majority of these cases of infectious jaundice no etiological factor could be detected and it is obvious that the American epidemic cases recently reported vary considerably in severity from the European cases associated with the leptospira. In the American cases high and prolonged fever, swelling and tenderness of the liver and spleen have been but rarely observed and secondary fever not at all. Should these cases be eventually found to be due to leptospiral infection, as has been suspected, the organism must be a less virulent strain or other factors must make the people more resistant. C. M. W.

CLEYNDERT, Jr. (P. C.). **Spirochaetosis icterohaemorrhagica.**—*Nederl. Tijdschr. v. Geneesk.* 1927. Jan. 29. 71st Year. 1st Half. No. 5. pp. 562–567. With 1 text fig.

A man 33 years of age was admitted to hospital with fever, jaundice, enlargement and tenderness of the liver and other symptoms, on the 11th day of an illness which was of sudden onset. His serum tested against *Leptospira icterohaemorrhagiae* agglutinated it and caused lysis.

Two days after admission there was considerable improvement but death took place suddenly on the following day. No leptospira were found post-mortem, but the serological investigation is regarded as sufficient evidence of a leptospiral infection. Enquiry showed that the man had been accustomed to bathe in a certain swimming bath and it was found that two other persons who frequented it had suffered from a similar illness. The serum of one of these was strongly positive when tested against the leptospira. That of the other was feebly positive. It was further elicited that a swimming instructor had died earlier in the same year from a condition diagnosed as purpura fulminans. The swimming baths in question were supplied with water from a canal into which sewage drained while the washings from a neighbouring cattle market found their way into the bath. Rats abounded in the locality and an examination of these revealed leptospira, as also in the canal and bath water. More than half the adult rats examined in Gouda, S. Holland, were found to harbour the organism.

C. M. W.

GUTHRIE (A. Cowan). **A Case of Spirochaetosis Icterohaemorrhagica.**—*Lancet.* 1927. Feb. 12. pp. 337–338. With 1 text fig. [1 ref.]

A woman of middle age shortly before her return to England from Egypt began to suffer from general malaise. On the journey home she did not improve, while a tendency to sickness supervened. When seen on 23rd April, 1925, there was no fever but there was a yellowness of the skin which was definitely jaundiced on 27th April when catarrhal jaundice was diagnosed. On 28th and 29th April there was some improvement, but on the evening of 29th April there was a recurrence of sickness, the vomit being dark in colour. On 1st May the patient was very ill and she died on 3rd May. The statement is made that spirochaetes were discovered in enormous numbers when blood collected on 1st May was examined. [A drawing shows a number of threads with hooked ends lying amongst red blood corpuscles and leucocytes. Whether this is intended to represent a single field of the microscope is not stated nor is any information given as to the method of examination of the blood. The discovery of "enormous numbers" of spirochaetes in "blood collected" rather suggests that the spirochaetes were blood filaments. No other instance of such a heavy blood infection by leptospira has been recorded.]

C. M. W.

BATES (J. E.). **Leptospirosis icterohaemorrhagica (Weil's Disease) with Report of a Fatal Case.**—*Canadian Med. Assoc. Jl.* 1926. Dec. Vol. 16. No. 12. pp. 1466–1475. With 1 text fig. [108 refs.]

The paper gives a very careful and detailed description of a fatal case of Weil's disease in Canada, *Leptospira icterohaemorrhagiae* being found abundantly in the kidney after death. A point of special interest is that the patient first became ill 8 months before his fatal attack.

He had pain over the liver and was jaundiced for 2 weeks. He returned to work but continued to have occasional pain in the right side. Five months later he was admitted to hospital for this condition but no diagnosis was made. Later on his fatal attack commenced with pains all over the body, to be followed in 2 days by a violent chill and sweating. On the fifth day he became jaundiced, while on the seventh he had severe pain in the right chest and on admission to hospital stated that he had vomited some

black material. During his stay in hospital he became lethargic while the jaundice deepened. He coughed up small amounts of red currant jelly sputum and appeared very toxic. Later the liver decreased in size while the jaundice diminished. He appeared to be progressing satisfactorily till the 21st day when he had a chill lasting 3 hours, after which he became very weak and died on the 23rd day. At autopsy there was acute hepatitis, necrosis of the liver, icterus, acute parenchymatous degeneration of the kidney and acute suppurative nephritis.

It is suggested that the intermittent character of the disease extending over 8 months points to the possibility of the man being a carrier of the organism. Though cases of infectious jaundice have been recorded from Canada this is the first case in which diagnosis was established by the discovery of leptospira.

C. M. W.

HAYMAN, Jr. (J. M.) & LYNCH, Jr. (Frank B.). **Spirochaetal Jaundice in the United States.**—*Amer. Jl. Med. Sci.* 1927. Jan. Vol. 173. No. 1. pp. 80–89. With 1 text fig. [25 refs.]

A record of a case of Weil's disease in a Russian labourer in Pennsylvania. Leptospira were found in the blood which also produced the characteristic disease in guineapigs with presence of organisms in the kidneys. This is the fifth case with discovery of leptospira to be recorded from the United States.

C. M. W.

BURGER (G. C. E.). **Spirochaetosis icterohaemorrhagica.**—*Nederl. Tijdschr. v. Geneesk.* 1927. May 7. 71st Year. 1st Half. No. 19. pp. 2460–2463. With 1 chart in text. [5 refs.]

A case of Weil's disease in a soldier, in which the diagnosis was serologically and bacteriologically proved, but which otherwise offered no special features. The mode of infection remained uncertain.

The author thinks that many mild cases are still overlooked in Holland and that accordingly the disease is not such a fatal one as it would appear from the clinical material published so far.

W. J. Bais.

TIMMERMAN (W. Aeg.). Serumbehandeling bij de ziekte van Weil. [**Serum Treatment in Weil's Disease.**]—*Nederl. Tijdschr. v. Geneesk.* 1927. Mar. 26. 71st Year. 1st Half. No. 13. pp. 1572–1577. [23 refs.]

The author leads up to certain remarks he makes on the serological treatment of Weil's disease by giving an historical summary of the serology and other aspects of leptospiral infections. As regards the treatment he believes that immune rabbit serum injected intravenously in a dose of 30 cc., repeated if necessary, will materially increase the chance of recovery. The cases with bad prognosis appear to be those who have ingested water, as in the case of swimmers and drowning persons, and in such it is advisable not to be too sparing of the serum.

C. M. W.

SCHÜFFNER (W.) & SIEBURGH (G.). Zur mikroskopischen Frühdiagnose von Leptospirosen (Weilsche Krankheit, Gelbfieber u. a.). [**Early Diagnosis by Microscope of Leptospiroses.**]—*Muench. Med. Woch.* 1926. Nov. 19. Vol. 73. No. 47. pp. 1977–1978. [10 refs.]

—— & ——. **For the Early Microscopical Diagnosis of Leptospirae (Weil's Disease), Yellow Fever, and Others.**—*Jl. Trop. Med. & Hyg.* 1927. Feb. 15. Vol. 30. No. 4. pp. 48–49.

——. Zur mikroskopischen Frühdiagnose von Leptospirosen.—*Muench. Med. Woch.* 1927. May 20. Vol. 74. No. 20. p. 857. With 2 text figs.

The papers give the details of the method of triple centrifugation of blood of guineapigs for the demonstration of leptospira.

With a syringe charged with citrate solution 2 to 3 cc. of blood are drawn by heart puncture. After mixing with the citrate solution (which is a 20 per cent. solution to the quantity of one-tenth the volume of the blood) transfer to a centrifuge tube is made and the mixture centrifuged for 5 or 6 minutes at 1,500 revolutions. This throws down the white and red blood corpuscles. The supernatant plasma in which already leptospira can be more easily seen than in the original blood, is pipetted carefully into another tube and centrifuged at 1,500 revolutions for 10 minutes. The bulk of the platelets are thus deposited. The supernatant fluid is again removed to a fresh tube and centrifuged at double the original speed—3,000 revolutions—for 30 minutes.

By direct examination of the fluid at the various stages, the author has shown that definite concentration takes place, so that in the final deposit the leptospira are 800 times more numerous than in the same volume of the original blood and can readily be seen with the dark field if thin preparations are made. As many as 8 leptospira occur per field. The author has not yet had an opportunity of testing the method in human infections, but should it be applicable in these cases, it would simplify the early diagnosis of Weil's disease.

In the third paper there are reproduced two microphotographs illustrating the result obtained by the triple centrifugation method. In this case the blood was taken from a guineapig infected with the leptospira of yellow fever. The first microphotograph shows a field of a Giemsa stained film of the normal uncentrifuged blood of the animal. A single leptospira is seen. It is noted that such a picture is obtained only in one of every fifty fields. The second shows a field of a film of the deposit after centrifuging. About fifty leptospira are easily seen.

A further improvement in the method is given. After the second centrifuging has been carried out, saponin to a concentration of 1 in 1,000 or 1 in 2,000 is added to the plasma. This does not affect the leptospira in any way, but assists in removal of the blood platelets which tend to obscure the organisms.

C. M. W.

THEILER (Max) & SELLARDS (Andrew Watson). **The Relationship of *L. icterohaemorrhagiae* and *L. icteroides* as determined by the Pfeiffer Phenomenon in Guineapigs.**—*Amer. Jl. Trop. Med.* 1926. Nov. Vol. 6. No. 6. pp. 383–402. [7 refs.]

A very carefully conducted series of experiments in which 70 guineapigs were used, was designed to test the relationship of *Leptospira icteroides* (Brazilian strain Palmeiras No. 3.) to two strains of *Leptospira icterohaemorrhagiae* isolated from Boston rats. It was found that

animals which had been actively immunized against the former were completely protected against the latter and vice versa. The results constitute strong evidence of serological identity of the three strains. They do not afford any additional evidence regarding the relationship of *L. icteroides* to yellow fever, especially since the connexion of Weil's disease and yellow fever is not properly understood. The possibilities are too radical for detailed discussion, the extremes being that Weil's disease and yellow fever may be etiologically identical or that the leptospira may have no etiological relationship to yellow fever.

C. M. W.

SABRAZÈS (J.). Recherches sur la séro-agglutinabilité des spirochètes. Cholérine à spironèmes. [**The Sero-Agglutinability of the Spirochaetes. Cholerine with Spironemas.**]—*C.R. Soc. Biol.* 1926. Dec. 3. Vol. 95. No. 35. pp. 1347–1349. With 1 text fig. [1 ref.]

Cases of mixed infection with organisms of typhoid or paratyphoid and Weil's disease have been diagnosed, because in addition to the isolation of bacilli of the enteric group the serum agglutinated *Leptospira icterohaemorrhagiae.* The author put up the serum of known typhoid and paratyphoid cases, in the stools of which numerous spirochaetes occurred, as also the serum of a case of cholerine with heavy spirochaetal infection and no other known organisms, against *Leptospira icterohaemorrhagiae.* In no case was there any agglutination. This fact is in favour of the conclusions reached regarding the mixed infections.

C. M. W.

WALCH (E. W.) & SOESILO (R.). Vergelijkend serologisch onderzoek van te Batavia geïsoleerde en eenige andere Leptospira-stammen. [**Comparative Serological Investigation of Strains of Leptospira isolated at Batavia and elsewhere.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 1. pp. 84–98. [14 refs.]

Three strains of leptospira isolated in Batavia, one from a case of what appeared to be Weil's disease, and two from rats, were tested serologically against 6 antisera, viz., antiserum " Krommenie " made by injecting rabbits with a human strain of *L. icterohaemorrhagiae* from Holland, antiserum " Baltimore " from an American rat strain, polyvalent Weil-antiserum of Noguchi, antiserum " F " from an atypical Dutch rat strain, antiserum " Baermann " from Vervoort's *Leptospira pyrogenes*, antiserum " Yellow Fever " from Le Blanc's strain of *L. icteroides.* The 3 Batavian strains proved to be closely related to one another but showed no relation whatever to any of the others.

It is noted that no leptospira could be isolated from 7 cases of jaundice one of which showed the clinical symptoms of Weil's disease, from 4 cases of haemoglobinuric fever and 23 cases of fever of short duration.

C. M. W.

SARDJITO (M.) & POSTMUS (S.). Onderzoek naar het voorkomen van leptospirae onder de rattenbevolking van Weltevreden. [**Occurrence of Leptospira among the Rats of Weltevreden.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 1. pp. 73–83. [15 refs.]

Between the 25th November, 1925, and 12th August, 1926, 23 *Mus decumanus* and 17 *Mus rattus* were examined for leptospira infection. Only 4 of the *M. decumanus* were found infected. It was noted that direct inoculation of kidney material into Noguchi's medium was more likely to give a positive result than direct microscopical examination of kidney emulsion or its inoculation into guineapigs.

C. M. W.

UHLENHUTH (P.) & HERRMANN (Erika). Neue Untersuchungen ueber die Umwandlung der *Spirochaeta pseudoicterogenes* (Wasserspirochaete) in die *Spirochaeta icterogenes* (Erreger der Weilschen Krankheit). [**Conversion of** *S. pseudo-icterogenes* (**Water Spirochaete**) **into** *S. icterogenes*.]—*Med. Klin.* 1927. Apr. 22. Vol. 23. No. 16 (1167). pp. 599–601. [7 refs.]

The writers call attention to ZUELZER's observation that a strain of water leptospira after a year's cultivation in rabbit serum water became pathogenic to guineapigs and corresponded in every way with the leptospira of Weil's disease [this *Bulletin*, Vol. 21, p. 262.] They have extended these experiments and record one in which a water leptospira which had been cultivated for several years in rabbit serum water became pathogenic to guineapigs after being grown for 3 passages in normal wild rat serum. The lesions in the guineapig were like those caused by the Weil's disease leptospira.

Curiously enough, when inoculated to a guineapig at the 6th passage, it failed to infect, as also did another water strain in its third passage in normal rat serum. In another experiment, young wild rats in which the reticulo-endothelial system had been blocked with Indian ink were inoculated intraperitoneally with a water strain. In 12 of 20 animals the leptospira found their way to the kidneys. The kidneys of these rats, which were killed on the 10th day, were emulsified and the mixture inoculated into 8 guineapigs, 6 of which died with all the symptoms and lesions of experimental Weil's disease. The infection was transmissible by subinoculation to other guineapigs. The authors have thus succeeded in making pathogenic a water strain of leptospira by passing it through young rats. The organism was isolated in culture from these animals, and it was found that serologically it had become distinct and was not influenced by an antiserum prepared from the original water strain from which it had been derived. Similarly its own antiserum did not influence the water strain. Inoculated from the liver of two of the infected guineapigs together with true Weil's serum, no infection resulted, whereas when mixed with the serum of the original water strain or normal rabbit serum infection occurred. Thus the water strain which had become pathogenic to guineapigs, had not only changed its serological characters, but had assumed those of the leptospira of Weil's disease. It is clear therefore, that the view that rats obtain their infection from water leptospira, has some experimental basis. How this transformation occurs in nature further researches must explain. It has to be assumed that the water strains do not necessarily have to pass through the rat to become pathogenic to man, for in certain human cases, no connexion with rats has been found, infection appearing to take place directly from water.

C. M. W.

KABESHIMA (Tamezo). **On the Filterability of** *Spirochaeta icterohaemorrhagiae.—Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 139–141.

Cultivating *Leptospira icterohaemorrhagiae* in a medium consisting of sterile tap water (pH 7·1) to which is added in a quantity of 5 to 10 per cent. defibrinated rabbit's blood heated at 56° C. for one hour, attempts were made to pass the organisms through various Chamberland and Berkefeld filters under slow negative pressure or, as in the case of experiments with half the Berkefeld filters, no pressure. In all, 106 Chamberland, and 24 Berkefeld filters were used. The conclusion reached is that the leptospira of Weil's disease does not pass through a filter which does not permit the passage of *Bacillus prodigiosus.*

C. M. W.

DEN HARTOG (J. C.) & VAN STEENIS (P. B.). Een geval van verworven haemolytischen icterus met miltextirpatie bij een inlandsch fuselier. [**Case of Haemolytic Jaundice with Splenectomy in a Javanese Soldier.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1926. Vol. 66. No. 5. pp. 684–705. With 6 figs. (2 coloured) on 2 plates. [16 refs.]

Though haemolytic jaundice is a rare condition in the Dutch East Indies one of the authors has seen 5 cases during 2 years. A case in a Javanese soldier is described in detail. He suffered from fever, jaundice and enlargement of the spleen and liver. There was a positive Wassermann reaction and evidence of cirrhosis of the liver. The haemoglobin index was 23. The spleen was removed and soon after the haemoglobin index mounted to 60 and thereafter fluctuated between this figure and 80. The case was also complicated by malaria, a severe attack occurring about 5 weeks after the splenectomy. It is thought that the condition was due to a staphylococcus infection, for a pure culture of *S. pyrogenes aureus* was obtained from the removed spleen and again from the blood the day after the onset of the severe malarial attack, which responded quickly to quinine treatment. The septic condition was treated by intravenous injections of a 5 per cent. solution of gentian violet, 30 cc. being given twice a week.

C. M. W.

PRAUSNITZ (Carl) & LUBINSKI. Untersuchungen ueber das "Schlamm-Fieber." [**Investigations into Mud Fever.**]—*Klin. Woch.* 1926. Oct. 29. Vol. 5. No. 44. pp. 2052–2054. With 2 text figs. [2 refs.]

During the floods which inundated large tracts of land in Silesia, there occurred in the summer of 1925 numerous cases of a febrile condition which in many respects resembled mild Weil's disease without jaundice. In certain districts the cases numbered many thousands. The onset is sudden, with various bodily pains, and the temperature quickly rises, to remain continuous for 5 to 7 days. A fall to normal then occurs, to be followed after one or two days by relapse, and in some cases a second relapse. A rash in the form of red papules occurs in some instances. There is marked conjunctivitis and photophobia. Jaundice was never observed. Attempts to discover the cause of the disease were not attended with much success. Animal inoculations and direct blood examination yielded no information. Blood cultures for isolation of leptospira showed in certain cases motionless structures resembling

spirochaetes, while one of the cultures 10 days later was found to contain active spirochaetes of the Weil's disease type. It is admitted that these results are unsatisfactory. The nature of the disease is discussed at length. An insect borne infection such as dengue appears to be excluded, the authors inclining to the view that the disease is water-borne. They think that it may be actually leptospiral in nature.

C. M. W.

i. INADA (Ryokichi). **On Nanukayami (Seven Day Fever) in Japan.**—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 113–115.

ii. TAKAGI (Sampei), SEGI (Moto-O) & SAWADA (Taku). **Researches on Akiyami.**—*Ibid.* pp. 117–119.

i. The information given in the first paper regarding *Leptospira hebdomadis* appears to be the same as that published by KOSHINA, SHIWOZAWA and KITAYAMA in 1924 (this *Bulletin*, Vol. 22, p. 176).

ii. The writers of the second paper agree that two types of *L. hebdomadis* occur but show that types of intermediate virulence are also found. They are disinclined to regard the types as distinct species, but believe that the variations in virulence are due to external factors such as environment, strength of virus and other undetermined conditions.

C. M. W.

VINZENT (René). Isolement et culture de spirilles et de spirochètes des eaux. [**Isolation and Culture of Spirilla and Spirochaetes of Water.**] —*C.R. Soc. Biol.* 1926. Dec. 17. Vol. 95. No. 37. pp. 1472–1474.

By filtering waters through Chamberland F and L^3 filters, the author has succeeded in isolating in pure culture three spirochaetes. The first is the well-known water leptospira. It was cultivated in rabbit serum water. It is noted that if the medium prepared with drinking water gives a poor growth the addition of a small quantity of sterilized sewage water, will remedy the defect in the medium. Of the two other spirochaetes, one is named *Spirochaeta aurantia*. It measures 5 to 20 microns in length, and has 4 to 12 turns. It grows well in a tube of sloped nutrient agar filled with sterile water, the optimum temperature being 33° C. In 24 hours growth can be detected at the top of the liquid. After several days, the growth collects at the bottom in orange coloured masses. The organisms remain alive for several months. On the surface of agar orange colonies are produced. Other media were tried but these were not so satisfactory as the first mentioned. The third spirochaete cultivated is named *Spirillum penetrans*. It grows well in the medium noted above. In young cultures it measures not more than 4 to 6 microns and has two or three turns. In older cultures it reaches 10 microns with four or five turns. It is 0·3 microns thick, has a rigid body and like *S. aurantia* is very rapid in its movements. It is provided with flagella. Another organism which resembles it in every way save for the absence of flagella and lack of motility has also been cultivated.

C. M. W.

DIMITROFF (Vladimir T.). *Leptospira biflexa* (**Wolbach and Binger, 1914. Emend. Noguchi, 1918**).—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 508–515. With 1 plate. [26 refs.]

Water samples were tested for the presence of leptospira by HINDLE's faecal culture method. The water (about 100 cc.) was distributed in Petri dishes and to each was added sterile faecal emulsion to give a concentration of about 1 to 2 per cent. of faeces. The dishes were kept in the dark at room temperature and examined weekly for five weeks. It was found that *Leptospira biflexa* occurred in 69 per cent. of all water samples examined, and in 87·5 per cent. of drinking water from 47 cities. Pure cultures of leptospira were obtained by filtration through Berkefeld filters. The procedure was to fill the glass mantle with 10 to 15 per cent. sterile faecal emulsion and allow this to gravitate through for about an hour. The faecal emulsion is then poured off and replaced by the impure faecal culture of the leptospira. A loopful of the filtrate from the nipple of the filter was transferred to a sterile medium consisting of 1 to 2 per cent. faeces in tap water every five minutes for 2 hours. After 10 to 20 days incubation at 27° C. these cultures were examined for leptospira. When the organisms were established in the faecal medium 1 to 4 per cent. of rabbit serum was added in successive subcultures till finally transfer was made to pure rabbit serum in tap water. For satisfactory staining of the organisms the following method is recommended. Culture is spread as a very thin film on a clean slide and exposed to the vapour of 1 per cent. osmic acid. It is then air-dried and immersed for 30 minutes in Fontana's solution (acetic acid 1, formalin 2, distilled water 100). After thoroughly washing in water the slide is placed for 4½ hours in a mixture of 1 cc. stock solution of basic carbolfuchsin and 1 cc. of saturated alcoholic solution of gentian violet in 50 cc. distilled water. The film is then thoroughly washed in water for 5 to 30 minutes and dried.

Attempts to infect animals with *L. biflexa* failed. An immune serum prepared from it, did not agglutinate nor protect animals against *L. icterohaemorrhagiae* while a serum prepared from the last named did not agglutinate *L. biflexa*.

C. M. W.

SCHÜFFNER (W.) & MOCHTAR (Achmad). Versuche zur Aufteilung von Leptospiren-stämmen, mit einleitenden Bemerkungen ueber den Verlauf von Agglutination und Lysis. [**The Differentiation of Leptospira Strains. The Course of Agglutination and Lysis.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. Feb. 5. Vol. 101. No. 6–7. pp. 405–413. With 1 text fig. [5 refs.]

For the serological differentiation of leptospira the authors have elaborated a technique which gives more precise results than that hitherto employed. It involves the addition to quantities of a culture of leptospira of serum in varying concentrations. The authors have found the white porcelain plates made with a series of hollows, such as are used for mixing paints, very suitable. After mixing culture and serum in the hollows, the plate is covered and left for 16 hours, when observations are made by taking platinum loopfuls after mixing and making direct observation with the dark field, under a low power objective so as to avoid the necessity of a cover glass. It will be found that with the higher concentrations of serum (1 in 10 to 1 in 100) the

leptospira are agglutinated. As the dilution becomes greater (1 in 100 to 1 in 500) there is less intense agglutination while lysis of the leptospira becomes evident. With still higher dilutions (1 in 500 to 1 in 10,000) agglutination entirely ceases, and lysis becomes almost complete. From dilutions of 1 in 10,000 to 1 in 100,000 lysis ceases, both this phenomenon and agglutination not occurring. During the whole of this process a certain, but small proportion of the organisms are not involved and move about in the liquid around the agglutinated clumps or those undergoing lysis as the normal individuals in the original culture in the control preparation. As the dilutions at which lysis ceases are reached, the normally moving organisms rapidly increase in number till, as noted above, all continue to move as in the control preparation. If at the height of the lytic phenomenon, when only a comparatively small number of survivors exist, a subculture is made, the resulting culture consists of leptospira evidently derived from these resistant forms. Nevertheless, if with this culture the serological test is repeated the same sequence of events occurs, showing that the leptospira derived from those which withstood the lytic action of the serum are on the whole just as susceptible as the organisms in the original culture. The authors believe that by observing the effect of sera on leptospira by the above method and charting the results of agglutination, lysis and survival in separate columns and indicating the intensity of each phenomenon (+ to + + + +) it will be possible to identify the leptospira with some degree of certainty.

C. M. W.

LÉPINE (Pierre). Présence de spirochètes libres dans l'eau de conduite de Beyrouth. Etude et culture. [**Free Spirochaetes in Tap Water at Beyrouth.**]—*C.R. Soc. Biol.* 1927. Feb. 11. Vol. 96. No. 5. pp. 320–322. [1 ref.]

The spirochaete referred to in the title had the characters of the leptospira which is commonly found in water.

C. M. W.

YELLOW FEVER.

LASNET. Compte rendu des cas de fièvre jaune observés en Afrique Occidentale Française, de juillet 1926 à février 1927. (Rapport de Marchoux.) [**Record of Cases of Yellow Fever seen in French West Africa between July 1926 and February 1927.**—*Bull. Acad. Méd.* 1927. May 3. 91st Year. 3rd Ser. Vol. 97. No. 18. pp. 560–568. With 1 map in text.

During 1926 yellow fever occurred in both the British colonies of the Gold Coast and Nigeria. In the former there were 26 cases with 12 deaths and in the latter 10 cases with 7 deaths. It is remarkable that the French colony Dahomey, which lies between the British colonies, and the Upper Volta which borders the Gold Coast have had very few cases—2 at Porto-Novo with one death and 2 at Gaoua, both of which were fatal. In Senegal, on the other hand, where there is a bigger white population, there were 34 cases with 29 deaths. Of the 34 cases 16 were in Syrians and 18 in Europeans. In addition, there were 19 suspicious cases with 12 deaths. They were not included in the returns because of doubt as to the diagnosis. The first case, referred to in another review, was that of a Syrian from Kaolack who died on July 15th. Nothing further happened till October when further cases occurred. They were directly connected with the arrival by ship, the "Madonna," at Dakar of a convoy of 200 Syrians, mostly new comers to Africa. Of these 50 went to Kaolack, where they remained 2 or 3 days before being sent along the Thies-Kayes railway. These Syrians were badly housed without hygienic precautions, mixed with the natives and had no protection against mosquitoes. On October 15th one of them was taken seriously ill at Gossas and died on the 18th. Jaundice and anuria were the chief symptoms. There was no black vomit, but the autopsy confirmed the diagnosis of yellow fever. From October 20th to the middle of November, the convoy from the ship supplied 6 other cases with symptoms which left no room for doubt as to the nature of the disease. Of the total of 16 cases amongst the Syrians, only 4 were in persons who had resided in Africa more than a year. Similarly amongst the Europeans there were 18 cases, 14 of which were in comparatively new arrivals. The distribution of the cases in Senegal is of interest. There were 3 foci, viz., Saloum, Diourbel and Rufisque. In the first Kaolack supplied the first case, and probably the first of the "Madonna" series. In the second Diourbel had 4 cases in Europeans, and it is possible that the 3 Syrian cases at M'Baké came from the same town. The third focus was the most important, there being 8 cases in persons who had not left the town for several weeks. Stegomyia was abundant at Rufisque at that season, and occurred also in the other foci.

Laboratory work yielded no information as to the etiology of the disease, though it substantiated the diagnosis of yellow fever. Tissues were examined by the American mission at Lagos and the diagnosis was confirmed.

As regards prevention certain suggestions are made for the future. It is becoming increasingly evident that there must be a native reservoir of infection and that it is impossible to expect for many years to come that French West Africa will be completely sanitary and that Stegomyia will be extinct. This being so; (1) the sanitation of the endemic foci must be vigorously undertaken; (2) a mosquito-proof room must be

insisted upon in all buildings occupied by white people, so that any case of suspicious fever can be at once screened ; (3) the water supply must be regulated ; (4) a stock of wire gauze, protective cages, chemicals for disinfection, etc., must be stocked ready for use ; (5) the medical officers must be alert ; (6) a school of instruction must be established at Dakar for all who may have to deal with the disease ; (7) the population must be instructed in the various areas ; (8) vaccination by Noguchi's vaccine must be continued, but not at the expense of anti-larval measures which are the basis of prophylaxis against yellow fever.

C. M. Wenyon.

AITKEN (A. Blair) & SMITH (E. C.). **An Analysis of the Cases of Yellow Fever which occurred in Lagos, Nigeria, during 1926, with Notes on the Differential Diagnosis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Apr. 27. Vol. 20. No. 8. pp. 530–551. With 7 charts & 1 map in text. [1 ref.]

The paper describes in detail the clinical and pathological features of eight cases of West African yellow fever, which were brought into the European hospital at Lagos during the period July to November 1926. This careful account of the cases is of special interest in view of the vexed question of the actual nature of the disease and its relation to the yellow fever of the New World. Of the eight cases, seven occurred in Lagos and one in Oshogbo, a town 200 miles inland by rail. The Lagos cases, with the exception of two, occurred either in a limited area of the township or in various harbour craft. There is evidence that the two exceptions also contracted their infection in the limited area though they fell ill elsewhere. Of the eight cases, five were fatal. A study of the cases has shown that there is no distinctive feature in the early stages. Even up to the first or second day yellow fever and malaria may resemble one another, pyrexia commencing with headache and rigor, followed by backache, general malaise, nausea and perhaps vomiting being common to both. When the patient is not seen until the third day of illness and the stage of stasis is well established, the diagnosis in most cases will be obvious. Yet in the present series owing to the mildness of some of the cases and the slow development of the disease, diagnosis was not established till later. Blood examination may enable a diagnosis to be made, but a negative finding if quinine in considerable doses has been taken does not necessarily exclude malaria. Even a positive find of malarial parasites must be accepted with reservation, as diagnostic of malaria, unless a heavy infection is present. Of great importance is the rapid increase in albumin in the urine within one or two days, yet in some cases the albuminuria does not exceed that in malaria. Icterus is as a rule an inconspicuous feature till a late stage is reached. If a patient is seen within 24 hours of the onset, and presents a picture of a malarial attack of some severity, associated with an absence of parasites suspicion should be aroused if nausea and vomiting persist, and if a rapidly developing albuminuria occurs there will be confirmation. A decline in the pulse rate with continued pyrexia will follow while the icterus will deepen. Put briefly pyrexia and heavy albuminuria in an endemic area of yellow fever is highly suspicious. The account of yellow fever as it occurs in the New World by the late H. R. CARTER in BYAM & ARCHIBALD'S *The Practice of Medicine in the Tropics*, shows that the African cases differ in several respects. They evolve more slowly, the liver is appreciably enlarged even in the acute fatal cases

and haemorrhagic signs, appearing first in the gums, have been by no means a constant feature. CARTER's claim that malaria may generally be differentiated by the facies even in the very beginning—the first few hours—has not been the experience in Lagos.

As regards the pathological findings in the five fatal cases, these are carefully described and tabulated. It is noted that there is disparity between the findings and deviation in certain respects from the picture of yellow fever as given by authorities on the subject. It would be premature to set up a pathological standard of macroscopic and more particularly microscopic appearance of the disease in West Africa.

C. M. W.

LE FANU (G. E. H.). **Yellow Fever at Accra, September, 1925.**—*Gold Coast Rep. Med. & San. Dept. for Period Apr. 1925–Mar. 1926.* Appendix B. pp. 51–54.

The report describes three cases of yellow fever, of varying severity which occurred at Accra in April, May and September, 1925. They were treated with intravenous injections of N.A.B. and all three recovered. Not one of the three had any marked quantity of albumin in the urine, and in two only a trace was found. It would appear that the diagnosis might be the subject of discussion.

C. M. W.

REVUE DE MÉDECINE ET D'HYGIÈNE TROPICALES. 1927. Jan.-Feb. Vol. 19. No. 1. pp. 16–17.—[**Discussion of Laurent's Paper "La fièvre jaune dans le golfe du Bénin," in** *Rev. Méd. et Hyg. Trop.* **1926. Vol. 18. Nos. 5 & 6.**]

The three writers TANON, Marcel LÉGER and PHELAN disagree with the views expressed by LAURENT regarding the nature of yellow fever in the gulf of Bénin (*ante*, pp. 101–103). The assumption that the cases diagnosed yellow fever were actually malaria has no solid foundation and to substantiate the claim it would be necessary to demonstrate the parasites of malaria which were not present in the cases. LÉGER remarks that LASSÈGNE said of hysteria that it was a basket into which one threw all papers which one could not classify. For a very long time malaria had fulfilled this rôle in the colonies. It was a convenient label which was attached without sufficient discernment to all the febrile affections of hot countries. It should no longer be so; a diagnosis of malaria can be proved.

C. M. W.

i. CAZANOVE (F.). Considérations sur les cas de fièvre jaune observés au Sénégal en 1912. [**Cases of Yellow Fever seen in Senegal in 1912.**]—*Bull. Soc. Path. Exot.* 1927. Feb. 9 & Mar. 9. Vol. 20. Nos. 2 & 3. pp. 197–204; 286–295.

ii. COUVY (L.). A propos de la fièvre jaune.—*Ibid.* 1927. Mar. 9. Vol. 20. No. 3. pp. 295–299. [2 refs.]

i. The first paper describes in detail the history of 7 cases of yellow fever which occurred in Dakar in November 1912. In the previous year, on September 30th and October 2nd, there were two cases of the disease in Senegal. Following these, up to March 1912, there were 12 other cases 7 of which occurred in Dakar. Of the 14 cases 11 were fatal.

In August 1912, a doubtful case was noted at Kébemer, but there were 39 cases at various places before the end of the year. In September there were 6, in October 13, in November 17, in December 3. Of the 39 cases only 9 ended in recovery. Dakar contributed 11 cases and the present paper deals with 7 of these, 6 of which were fatal. The description of these 7 cases shows that the disease is of the type usually seen in Africa. It is noted that the post-mortem appearances were strikingly similar to those described by NOGUCHI from experimentally infected animals. The importance of early diagnosis from malaria is emphasized. If malaria is the cause parasites should be present; if quinine has been taken the drug should control the disease. A most important point is quantitative estimation of albumin in the urine. In severe malaria, the albumin may reach 0·1 to 0·2 centigrams; a quantity of 0·2 to 0·6 or 0·75 is inconclusive, but if it rises above this, the disease is yellow fever. Another important point is the redness of the face, combined with a sub-icteric tint of the forehead and the conjunctivae, which are injected. If the skin of the flank be rendered momentarily anaemic by pressure of the hand as the pale spots return to their original colour a transient subicteric tint will be noted. In addition there is marked mental anxiety even when the general symptoms are not severe.

As regards the epidemiology of the disease, it is noteworthy that the epidemics of 1911 and 1912 as also that of 1926 commenced after the summer, whereas those of 1900 and 1878 occurred in July, August and September. It would have been expected that the disease would occur at the end of the summer when there is the highest Stegomyia density. It is possible that the disease existed in milder form and unrecognized during the summer to appear as a more virulent type when the population was exhausted. Again it is possible that not enough is known of the bionomics of the Senegal Stegomyia, and its capacity for transmitting the disease.

ii. The second paper is an attempt to answer some of the questions raised in the first. The author does not agree that the 1926 outbreak was merely a winter one, for there was a fatal case in a Syrian at Kaolack in July 1926, while the cases noted at the end of October 1926 seem to have originated in the same Syrian colony. It is possible that a search would reveal the fact that other cases occurred between these dates. The winter of 1926 was a mild one, and the Stegomyia, which usually disappear in the winter, did not appear to be inconvenienced in any way and this seems to have been the experience throughout Senegal.

C. M. W.

NINAUD. Sur un cas de typhus amaryl traité par le sérum de Noguchi. [**Case of Yellow Fever treated by Noguchi's Serum.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 391–395.

The paper describes the case of a man 26 years of age, who three months after his arrival at Rufisque in Senegal became suddenly ill on 23rd January with pains in the loins. An hour or two later there was a violent rigor, vomiting and anxiety. The temperature rose to 40·4° C. The next day there was no improvement. The epigastrium was tender and the vomit contained bile and was streaked. The urine was highly albuminous and a diagnosis of yellow fever was made. The following day vomiting continued, the material brought up being brown in colour and containing tobacco grain flecks. Noguchi's serum was then injected in two doses of 2 cc. and 48 cc. at 20 minutes interval. This was followed by a violent reaction after which there was improvement. Eight hours later there was

a return of the symptoms, which continued. The facees contained black material. The following day (26th January) another dose of 50 cc. of serum was given, which was again followed by a reaction and improvement. On 27th January, after a bad night, slight subconjunctival jaundice was noted. A further dose of 50 cc. of serum was given. Again there was a reaction, followed by relative calm. On the morning of 28th January the patient appeared better but became worse and a fourth dose of 50 cc. of serum was given. After this the patient steadily improved and was regarded as convalescent on 30th January.

In spite of the absence of certain symptoms regarded as characteristic, the case is considered to be one of yellow fever and the serum absolutely specific.

C. M. W.

JUNIOR (Vianna). O phenomeno de Pfeiffer na febre amarella. [**Pfeiffer's Test in Yellow Fever.**]—*Brasil-Medico.* 1927. Jan. 15. Vol. 41. No. 3. pp. 51–55.

The cultivation of a strain of leptospira from a case of yellow fever in Bahia, brings to 16 the number of strains isolated from this disease by NOGUCHI and others. An opportunity was afforded of conducting serological investigations with the isolated organism and yellow fever convalescents. Pfeiffer's test was carried out with the result that it is demonstrated that yellow fever occurs not only in the capital Bahia, but also in the interior of the country.

C. M. W.

SELLARDS (Andrew Watson). **The Pfeiffer Reaction with Leptospira in Yellow Fever.**—*Amer. Jl. Trop. Med.* 1927. Mar. Vol. 7. No. 2. pp. 71–95. [17 refs.]

The author has investigated Pfeiffer's phenomenon in its relation to yellow fever and Weil's disease. The serum of eleven patients taken three-and-a-half months after recovery from yellow fever gave a negative reaction with both *Leptospira icteroides* and *L. icterohaemorrhagiae*, while the serum of two guineapigs immunized against *L. icterohaemorrhagiae* gave a positive reaction with both organisms. A striking and characteristic feature of leptospiral infections is the development and persistence of immune substances, which are readily demonstrable by the Pfeiffer phenomenon. The results furnish evidence of the identity of *L. icteroides* and *L. icterohaemorrhagiae*, and do not support the view that *L. icteroides* is the etiologic agent of yellow fever. If *L. icteroides* were the etiologic agent of yellow fever and identical with *L. icterohaemorrhagiae*, then there would be a possibility of an almost unlimited rodent reservoir of the virus. The occurrence of a negative Pfeiffer phenomenon in cases of undoubted yellow fever, shows that a negative reaction in the case of the West African disease would tend to confirm rather than refute the yellow fever nature of the disease. It becomes necessary to review the evidence of the susceptibility of animals to yellow fever, and to reconsider seriously the older view that the actual virus is in nature limited to man and the mosquito.

C. M. W.

SCHÜFFNER (W.) & MOCHTAR (Achmad). Gelbfieber und Weilsche Krankheit. [**Yellow Fever and Weil's Disease.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Apr. Vol. 31. No. 4. pp. 149–165. With 14 text figs. [10 refs.]

Employing about eighteen different strains of leptospira, including yellow fever strains, the authors have conducted an elaborate series of serological tests with a view to establishing the identity of *Leptospira icteroides*. The tests involved the use of specific antisera prepared in rabbits for Pfeiffer's reaction, cross immunity and agglutination. The results are set out in a series of tables and they indicate that it is impossible to differentiate the yellow fever strains from those of Weil's disease. Assuming that the two are identical, various possibilities regarding the relationship of leptospira to yellow fever suggest themselves, and these are discussed in detail.

C. M. W.

HEITZMANN (Otto). Vergleichende pathologische Anatomie der experimentellen Gelbfieber-, Weil- und Sumatrainfektion. [**Comparative Pathological Anatomy of Experimental Yellow Fever, Weil's Disease and Sumatra Infection.**]—*Arb. a. d. Reichgsndhtsamt.* 1926. Vol. 57. pp. 48–63. With 3 text figs. [16 refs.]

The paper is the result of a detailed histological study of the changes induced in guineapigs by three types of leptospira—those of yellow fever, Weil's disease, and the Sumatra disease. The general conclusion reached is that all three organisms induce similar changes, the only differences noted being those of degree. There is agreement as regards blood destruction apart from the characteristic haemorrhages, the marked reaction of the reticulo-endothelial system towards the blood-invading organisms and red blood corpuscles and the parenchyma changes in the liver, kidneys, suprarenals and heart. With the Weil's disease organism there is more marked damage to the muscles, but this and other differences are indications of a gradation and have no bearing on the fact that an identical picture is produced by all the three strains.

C. M. W.

HOFFMANN (W. H.). **Yellow Fever as a Far Eastern Problem.** —*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2. pp. 143–157. With 4 maps in text.

Though the rapid eradication of yellow fever in S. America and the quarantine service in the American sea ports ensure the absence of any practical danger for the Far East, nevertheless so great would be the catastrophe of the importation of the disease that the scientific study of the problem should not be neglected by the Far Eastern authorities so that it would be possible to effect immediate isolation of the first imported and suspicious case, protection by serum of all possibly exposed to infection and institution of antimosquito measures.

C. M. W.

RÜDER (F. B.). Prophylaxe und Therapie des Gelben Fiebers an der westafrikanischen Küste. **Prophylaxis and Treatment of Yellow Fever on the West Coast of Africa.**] —*Deut. Med. Woch.* 1926. Aug. 20. Vol. 52. No. 34. pp. 1424–1426. [7 refs.]

Having visited Lagos in October 1925 and collected information regarding cases of yellow fever, the author discusses the disease and the possibilities of prophylactic vaccination and serum treatment.

C. M. W.

DE MATTOS (Emygdio). Epidemiologia da febre amarella. [**Epidemiology of Yellow Fever.**]—*Sciencia Med.* 1926. Oct. 31. Vol. 4. No. 10. pp. 522–538. [1 ref.]

A historical account of yellow fever in Brazil and of the development of knowledge of the epidemiology of the disease.

C. M. W.

HOFFMANN (W. H.). Die Gelbfiebergefahr im Mittelmeer.—*Arch. Ital. Sci. Med. Colon.* 1926. Sept.–Oct. Vol. 7. No. 9–10. pp. 173–178.

——. Hygienische Betrachtungen ue ber das Gelbfieber in Afrika.—*Muench. Med Woch.* 1926. Dec. 10. Vol. 73. No. 50. pp. 2116–2117.

——. La profilaxia de la fiebre amarilla.—*Siglo Méd.* 1926. Dec. 18. Year 73. Vol. 78. No. 3810. pp. 598–599.

——. Gelbfieber als Weltproblem.—*Seuchenbekämpfung.* 1927. Vol. 4. No. 1. pp. 10–13.

MALARIA.

FEDERATED MALAY STATES. **Annual Report of the Malaria Bureau for 1925.** [WILLIAMSON (K. B.), Malaria Research Officer.]—*F.M.S. Ann. Rep. of the Inst. for Med. Res. for the Year 1925.* pp. 14–23.

Anopheline larval distribution in relation to the pH of the water has been investigated. The numbers of larvae collected per 100 dips were as follows :—

pH	No. of Plots.	*A. fuliginosus.*	*A. sinensis.*	*A. barbirostris.*	Total.
6·6	5	23	13·7	·9	37·6
6·4	3	17	10·5	1·0	28·5
6·3	1	2·7	2·7	—	5·4

There appears to be complete cessation of development when the acidity is that indicated by pH 6 or a lower figure. Apparently acidity is equally detrimental to the rice crop as to larvae.

Experiments on the water of the Bukit Merah Reservoir suggest that larvae fail to survive in it because of lack of food. Its pH is usually a little below 6. It was found too that larvae of the anopheline species mentioned and of *A. vagus* bred freely in a ditch whose water had a pH of 5·3 to 5·6 but in which food was abundant. Other experiments were made on larva-destroying water-insects. These were not exactly identified, but a "large belostomid bug" was a very active destroyer. Of submerged plants, *Utricularia flexuosa* appears to limit anophelines to *A. sinensis* and *A. barbirostris* or to eliminate them altogether. The presence of other plants is considered. "Roasted Amang," a ferruginous residue, proved a fairly efficient larvicide, as did rubber oil. The latter, mixed with solar and crude oils, considerably increased their efficiency.

C. L.

WALCH (E. W.) & SOESILO (R.). **Investigation of a Malarial Epidemic in Tegal, during the First Months of 1926.**—*Meded. Dienst d. Volksgezondheid in Nederl-Indië.* 1927. Pt. 1. pp. 1–96. With 29 photos & 13 figs. (including 2 coloured folding maps & 1 sketch map). [7 refs.]

This characteristically thorough report is, in great part, necessarily of local interest only. It deals with parasite index, spleen index, rainfall, mortality, breeding places and house catches of anopheles, their dissection, the relation between them and malaria, and quinine distribution. The investigation was called for as the result of a malarial epidemic beginning in January 1926, the investigation being carried out from the middle of March to the middle of April. *A. ludlowi* was implicated as the chief vector, 2 per cent. infected as against 0·2 per cent. for *A. rossii*. The former was found breeding freely in the coastal zone, its breeding places having extended here as compared with a previous investigation; yet the larvae were entirely absent from the town itself although the imagines were found distributed throughout it. A new fact is recorded in the discovery of *A. fuliginosus* breeding in salt water up to 17 parts per thousand. There is doubt as to the implication of *A. aconita*, which breeds in rice field and ditches.

It is advised that attention be first directed to the breeding places of *A. ludlowi* and that those of *A. aconita* be attacked only if the measures directed against *A. ludlowi* should fail in reducing the local malaria.

C. L.

SEVERN (A. G. Millott). **Malaria, and Malaria Prophylaxis in Formosa.** —*Caduceus Jl. Hongkong Univ.* 1926. Nov. Vol. 5. No. 3. pp. 219–226.

The writer spent a week in Formosa, by invitation of the Japanese Government, on his way home from Japan at the conclusion of the Interchange of Health Officers of the Far East organized by the League of Nations. He reviews the local conditions, particularly contrasting them with those of Hongkong. The three commonest anopheles in both places are *A. hyrcanus* var. *sinensis*, *A. minimus* and *A. maculatus*. In Formosa the first is said to be a vector of tertian and quartan malaria and the other two of subtertian. *A. hyrcanus* is by far the most widely spread species. Since 1897 the number of malarial cases *treated* has increased tenfold and the deaths have fallen to about a tenth. Apparently, in certain areas at least, blood examination is enforced and treatment compulsory for the infected. Notification and the use of mosquito nets are officially pressed and general prophylactic measures widely adopted.

C. L.

TIEDEMAN (Walter v. D.). **Malaria in the Philippines.** —*Jl. Preventive Med.* Baltimore. 1927. Jan. Vol. 1. No. 3. pp. 205–254. With 23 text figs.

The Philippine Health Service has stated that malaria accounts there for a morbidity of 301·9 per 100,000 of the population and for 14·3 per cent. of the deaths. In 14 deaths reported as malarial post-mortem examination by the author showed that only 5 were due to that infection. The work he reports covered two years and eight months and was varied and exhaustive. The population was poor, shifting, housed so badly that screening was inapplicable, and made little use of nets. Diagnosis was by at least 15 minutes' examination of a thin smear, of which 6,343 were searched with 17·8 per cent. of positives. Of the positives the percentages were 72·5 for tertian, 16 for quartan, 10·5 for subtertian and 1 for mixed infections. The parasite index was 30·3 in floating populations and 15·5 in comparatively fixed ones. The number of anophelines roughly follows the rainfall except in the case of the stream breeders, which appear after the flooded streams contract; yet toward the end of the dry season large numbers of the young of certain fish appear to control breeding temporarily. The anophelines concerned in transmitting malaria appear to be the seasonal stream breeders *A. ludlowii* and *A. minimus* and the amount of malaria transmitted is of economic importance. Tree holes and axils of palm and banana leaves did not furnish any larvae, nor did rice fields breed the main malaria conveyors. Much care was expended in an effort to test the effects of quinine but the results were rendered nugatory by the floating character of the population. Paris green as a larvicide appears to offer the best promise. "Some means of attracting mosquitoes to traps will have to be developed in order to do effective work for these small communities."

C. L.

WILSON (P. W.). Notes d'inspection sur la malaria parmi les émigrants de Port-de-Paix à destination de Cuba. [**Malaria among Emigrants leaving Haiti.**]—*Bull. Soc. Méd. d' Haiti.* Port-au-Prince. 1927. Apr. Year 1. No. 2. pp. 19–24.

Some 6,400 emigrants leaving Port-de-Paix, Haiti, for Cuba, who had passed a physical examination to eliminate the weakly, were examined for malaria parasites by the thick film method, modified according to BARBER and KOMP. The infected numbered 26 per cent. Of these, 80 per cent. harboured subtertian, 19 per cent. quartan and less than 1 per cent. tertian malaria. Few mixed infections were discovered. At first the examiners had identified *P. vivax* in a certain number of smears, but BARBER classed them as *P. falciparum* and that arrangement was acted upon afterwards. In these apparently healthy persons the number of heavy infections was surprising. Some showed 50 or 60 parasites per field, while 5 or 6 parasites per field were not uncommon. Of 277 children about 24 per cent. were infected.

C. L.

PRADO (Alcides) & PESSOA (Samuel B.). Ligeiras considerações sobre alguns pontos da epidemiologia e prophylaxia da malaria no Estado de S. Paulo. [**Some Points in the Epidemiology and Prophylaxis of Malaria in the State of S. Paulo.**]—*Sciencia Med.* 1927. Feb. 28. Vol. 5. No. 2. pp. 81–99. With 2 text figs. & 1 folding chart.

The conclusion of a well-documented paper is that the last ten-year period shows a certain parallelism between malarial deaths and rainfall, and that the former can be foretold from the latter. Banana cultivation, with the ditching involved, produces an excellent breeding ground for anopheles, a list of those found being supplied. Up to 14 years of age a palpable spleen is a better malarial index than the finding of parasites and is more readily produced by *P. vivax* than by *P. falciparum.* In adults the numbers with enlarged spleen and with parasites are about equal. Parasites are found throughout the year; quartan is the rarest, and tertian the commonest. It is held that antilarval measures, particularly one per cent. of Paris green in dust, and quininization should both be practised, and that *A. tarsimaculatus* is the best vector of tertian and *A. argyrotarsis* of subtertian malaria, although the latter is sufficiently capable of transmitting *P. vivax.*

C. L.

DAVIS (Nelson C.). *Anopheles pseudopunctipennis* **as a Malaria Transmitter in Northern Argentine Republic.**—*Amer. Jl. Trop. Med.* 1927. May. Vol. 7. No. 3. pp. 167–176. With 3 text figs. [6 refs.]

This paper covers a year's work in three villages in Chicligasta, Tucumán, Argentine Republic (lat. 27 20'S), with a mild climate. The rainfall is mainly in November to January, the last month showing, in 1926, a fall greater than that of the other two together. The anophelines present were *A. pseudopunctipennis, A. argyritarsis, A. albitarsis* and *A. tarsimaculatus.* BRÈTHES has recently renamed the second *A. rooti* and the fourth *A. evansi* [presumably on grounds of homonymy?].

Malaria reaches its apex in April. The captures of *A. pseudopunctipennis* in houses far exceed those of any other anopheles, the numbers in one village being 2,450 (of which 2,275 were females) as against 5 *A. albitarsis* and 3 *A. tarsimaculatus*. These numbers reach a high peak in March, a month before the malaria peak. Moreover, of 435 *A. pseudopunctipennis* dissected (431 stomachs and 313 salivary glands) twelve or 2·8 per cent. were infected. Judging by the pigment, the infections comprised both *P. vivax* and *P. falciparum*. No infection was found in the small numbers of other species captured in houses nor in the larger numbers (35) found attracted to animals. These comprised only one *A. pseudopunctipennis* [so that there was no appreciable attraction of this species away from man]. *A. pseudopunctipennis* bred in enormous numbers in the rivers in November and December and throughout the season in unshaded running water of all kinds, one of the worst breeding places being the moderately polluted village drain. The evidence, then, all points to *A. pseudopunctipennis* as the active definitive host. It is noted that in Panama the sanitary authorities have never attributed a major role in malaria to this insect, though PATERSON, in 1911, implicated it in northern Argentina, as has MÜHLENS.

C. L.

BARRETO (J. Sant'Ana). Index endémique du paludisme en Guinée Portugaise. [**Endemic Index of Malaria in Portuguese Guinea.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 280–285. [2 refs.]

Taking advantage of examinations rendered necessary by the finding of a case of sleeping sickness in Portuguese Guinea and finding that there was dislike on the part of the native population to the puncturing of cervical glands, Barreto examined thick films of finger blood.

In 236 cases his findings were :—

Trypanosoma gambiense ...	1	Mixed plasmodial infections	5
Plasmodium falciparum ...	52	*Microfilaria perstans* ...	19
P. vivax	25	*Microfilaria*, type ...	2
P. malariae	4	Negatives	128

The trypanosome infection was indigenous.

Two localities were investigated separated by 100 km., one the suburbs of Bolama, the other Buba with huts scattered through the bush. In the former the parasite index in 51 children up to 15 years was 57, the actual numbers infected with *P. falciparum*, *P. vivax* and *P. malariae* being 23, 3 and 2, with one mixed infection ; the splenic index was 18. In the latter in 103 children the parasite index was 41·7, with actual infections as above of 19, 21, 1 and 2 ; the splenic index was 27. In Buba is found *A. squamosus* to which is tentatively attributed the prevalence of *P. vivax*, while elsewhere the prevalent mosquitoes are *A. costalis* and *A. mauritianus*.

C. L.

BOYD (Mark F.). **The Tropical Splenomegaly of Strong and Shattuck.**—*Amer. Jl. Trop. Med.* 1927. Jan. Vol. 7. No. 1. pp. 21–26. [4 refs.]

In Part I of the Medical Report of the Hamilton Rice Seventh Expedition to the Amazon [*ante* p. 324], STRONG, SHATTUCK and WHEELER discussed splenomegaly under the headings of malaria, undulant fever, kala azar, tubercle, syphilis, splenic anaemia,

Banti's disease, Gaucher's disease, and the splenomegaly of Egypt. Apart from all these they held that there was a "tropical splenomegaly" which one of them had observed in North Africa, the Philippines, Singapore, China, India, Panama and other parts of Central America but nowhere so prevalent as in Amazonia. It is characterized by slow, painless, enlargement of the spleen, with irregular fever, digestive disturbance and some anaemia with, later, hepatic cirrhosis and ascites. In some districts it affects 50 per cent. of children. There may be first a leucocytosis with, sometimes, myelocytes; later a leucopenia. The large mononuclear leucocytes ranged between 5 and 18 per cent. Changes in marrow and spleen were also noted.

In comment Boyd, from some 4 years' experience in Central Brazil, does not agree that the writers have excluded malaria. He writes, "From the passages quoted it would appear that a large proportion of the cases they have diagnosed as 'tropical splenomegaly' present conclusive and indubitable evidence of present or past malaria infection," and that they have failed to prove their points.

C. L.

ROUKHADZÉ (N.). La stabulation du bétail, comme facteur de réduction du paludisme, dans certaines contrées d'Abkhasie (Géorgie). [**The Stabling of Animals as a Factor in the Reduction of Malaria in Georgia.**]—*Bull. Soc. Path. Exot.* 1927. Feb. 9. Vol. 20. No. 2. pp. 153–170. [14 refs.]

The investigation previously described [this *Bulletin*, Vol. 23, p. 561] has been continued. Discrepancies between text and tables make it difficult to determine exactly how long it was continued. In the former publication it was concluded that the relative immunity to malaria enjoyed by one of the villages investigated was to be attributed to stabling of animals. [It was indicated in comment that it was necessary to determine the distribution of anopheles in Georgian houses at all seasons and the relative distribution of these in animal houses and human habitations at the season of presumed infection before firm conclusions could be reached. This the present communication does not do. The human habitations were not searched, difficulties proving too great.] Anopheles were collected only in the animal houses and naturally showed a preponderance of animal blood. The writer's conclusions are that the villages concerned possess about the same number of mosquitoes but varying quantities of malaria, and house their animals to a different extent. In certain villages the malaria is inversely proportional to the head of housed animals, and proper housing of these is strongly advocated.

C. L.

ITALY: Ministero dell' Interno, Direzione Generale della Sanità Pubblica. [In Italian & French.] La malaria in Italia ed i risultati della lotta antimalarica (notizie epidemiologiche e profilattiche con prospetti statistici, diagrammi e cartogrammi dimostrativi). [**Malaria in Italy and the Results of Antimalarial Measures.**] –71 pp. With 16 plates (5 maps). 1924. Rome: Libreria della Stato.

This Report is issued by what may be described as the Ministry of Health of Italy. A series of clearly shaded maps and diagrams shows how steady was the fall in the incidence of malaria in Italy from 1900

to 1914, under the antimalarial measures which have been in regular force; and how the War, interfering with these, lead to an increase in the incidence of infection. The well-known Italian antimalarial legislation and organization are described with a summary of Italian experiments showing the efficacy of cinchonine in the treatment of malaria. The arrangements for subsidizing the issue of quinine—grants in money or kind—are described, as are the other prophylactic measures, such as peripatetic laboratories and ambulances, sanitary stations, sanatoria, bonifications great and small, and antilarval measures. The amount of State money spent on these measures is great, and a diagram shows in what a striking general inverse ratio over a period of years is this total to the malarial incidence.

C. L.

BASS (C. C.). **The Passing of Malaria.**—*New Orleans Med. & Surg. Jl.* 1927. Apr. Vol. 79. No. 10. pp. 713–717.

This historical survey, with no intention of being complete, points out how MORTON, in 1697, accurately described the malarial fevers epidemic in London, as also in England and Wales, while SYDENHAM, in 1726, gave a most complete description of the intermittent fevers prevalent throughout England and part of Scotland the infection continuing in parts of England until 25 to 50 years ago. Nevertheless anopheles were sufficiently abundant to reproduce indigenous infection when the disease was reintroduced in mass during the great war. At the beginning of the nineteenth century Holland was scarcely less notoriously malarious than the Agra Romana; now the infection is strictly and mildly focal. A hundred years ago, Rochefort and the mouth of the Gironde in southern France were intensely malarious; today the disease is practically unknown. The same holds for Wurtemberg and the Harz Mountains in Germany, and, in North America, for low-lying valleys in Minnesota and Michigan and round the Great Lakes. Between 1800 and 1850 New York and Philadelphia and their surrounding country was intensely malarious. Twenty years ago the infection was serious round Baltimore. At the time of the Civil War it was the largest single cause of death in the Southern United States, haemoglobinuria and coma being common. The recent decline has been most marked. In New Orleans 30 or 40 years ago large numbers of malaria cases were treated. Twenty years ago cases were always to be found in every ward of the New Orleans Charity Hospital with which Bass was connected, and, less than that period since, he remembers seeing 16 quinine abscesses in that hospital at the same time. At the present day, not only are there no cases originating in New Orleans, but very few come in from the surrounding country. Since in many places malaria is no less or has increased, for what reasons has it receded in the areas mentioned? The causes are put in this sequence. First, advance in civilization, that is in clearance and drainage of land for agriculture and industry; the diffusion of knowledge of the part played by mosquitoes and the increased protection employed against them; and finally the extensive and intelligent use of quinine particularly in reference to disinfestation and not merely to the elimination of clinical symptoms. Such a line of treatment is typically exemplified in the United States Standard Treatment—with which the name of Bass himself is so closely connected. In reply to a discussion and speaking of the *proper use* of quinine Bass said.

"There is probably no country in the world where quinine is used to as good advantage and where there is as little misuse of it in the treatment of malaria as in this country. Unnecessary hypodermic or intravenous administration of the drug is limited to the work of a comparatively small number of enthusiasts and the unreasonably excessive doses are also not used by a great many physicians."

C. L.

SOUTHERN MEDICAL JOURNAL. 1927. June. Vol. 20. No. 6. pp. 460–492. With 4 charts & 1 map. —**Symposium on Malaria.** [CUMMING (Hugh S.), BOYD (Mark F.), HARDENBERGH (W. A.), HOFFMAN (Frederick L.), BARBER (M. A.), KOMP (W. H. W.) & HAYNE (T. B.), HAYNE (T. B.), SMILLIE (W. G.), LEPRINCE (J. A.), WELCH (S. W.), ABERCROMBIE (T. F.), UNDERWOOD (Felix J.), DOWLING (Oscar), TAYLOR (H. A.), PUCKETT (Carl), BISHOP (E. L.), SAPPINGTON (H. O.) & GRANT (H. G.).].

At the twentieth Annual Meeting of the Southern Medical Association much interesting discussion occurred. Surgeon General Cumming held that the eradication of malaria was now only a matter of refinements in economy and put certain questions such as whether the mosquito should be attacked in pool or house, what was the control influence of quinine, what species of mosquito matter? Boyd referred to the diversity of practice in collecting data during a malaria survey, and proposed a scheme which should render comparable the results of different surveys. Hardenbergh related experience with waste motor oil mixed with "Kresol Dip. No. 1" which cost, to buy and apply, 5·75 cents. a gallon, spread well and was an effective larvicide. Larvae had lived in a flask for two weeks under a heavy coating of his best waste oil. Oil in dirty water was unsatisfactory. Hoffman wondered whether malaria was a factor inhibiting cancer in tropical lowlands. He quotes extensively from S. P. JAMES's work [this *Bulletin*, Vol. 23. p. 804]. Barber, Komp, and Hayne dealt with methods of estimating malaria endemically, history, mortality records, spleen index, parasite index, consumption of quinine and incidence among a definite section of the populace. Hayne described the results of a house-to-house survey. Smillie gave further particulars regarding the Gantt impounded waters [this *Bulletin*, Vol. 24, p. 256]. Control of *A. quadrimaculatus* was incomplete in part of the area for about a month, and about that region malaria appeared. It is essentially a pond breeder and is accordingly implicated as the vector in this case. Le Prince indicated certain problems in the improvment of drainage and the need of county health officers attacking more strenuously the malaria problem. The other papers dealt with local malarial problems in various parts.

C. L.

ARCHIVOS BRASILEIROS DE MEDICINA. 1927. Mar. Vol. 17. No. 3. (Numero Especial de Impaludismo: Fasc. I.) [**Special Malaria Number.**] pp. 143–250. [COUTO (Miguel), MOREIRA (Juliano), FIALHO (Abreu), ROXO (Henrique), MALAGUETA (Irineu), DUQUE (Henrique), COUTINHO (Eugenio), PIRES (Waldemiro), PÓVOA (Hélion) and PIZA (Wladimir).]

Couto holds that in subtertian malaria methylene blue (5 cc. of 1 per cent. solution) should supplement quinine. Moreira deals with the vexed question of neuropsychoses and points out that to attribute

these to the presence of a concomitant malarial infection is not correct. There must be antecedent or existent typical clinical symptoms, exclusion of other factors, the finding of plasmodia, and cure by the specific drug. Fialho, treating of ocular manifestations which are believed to be present in 15 to 20 per cent. of cases, lays particular stress on ophthalmic migraine, with scintillant scotoma, hemianopsia, nausea and vomiting. He agrees with Moreira regarding the need of care in attributing manifestations to malaria. Roxo associates with malaria four types of mental confusion, asthenic, stupid, hallucinatory and acutely delirious. His reasons do not appear to be stated in summary or original. Malagueta deals with the clinical diagnosis of malaria and holds that the laboratory, after repeated examinations, serves to confirm the clinical as the sounder method. Duque deprecates the attempt to systematize the administration of quinine. Each case must be treated on its merits. He, too, looks upon methylene blue as equally effective with quinine. Either drug may be given for *P. vivax*; both should be given for *P. falciparum*. If *P. vivax* infection is resistant to quinine, quinidine may be substituted. Coutinho writes that prognosis depends on the kind of parasite and its numbers, and on the duration of infection. The risk of relapse is held to be slight when treatment is well conducted. In children, prognosis is difficult, in old age, graver; pregnancy introduces an uncertain element. Pires notes that those with general paralysis are improved only in their mental symptoms; the basis of pathological anatomy and the humoral reactions are unaltered; he states that tabetics should be submitted to malarial infection. Póvoa and Piza give prominence to haemoclasia as the cause of the malarial paroxysm. It accompanies and does not precede the protein shock caused by the liberation of merozoits.

C. L.

Hodgson (E. C.), Vardon (A. C.) & Singh (Zorawar). **A Preliminary Note on a Quick and Simple Test for the Differentiation of Malaria from Kala-Azar, Enteric and other Fevers.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 779–784. [2 refs.]

The writers, coming upon a paper advocating "Linzenmeier's technique" for diagnosis and prognosis of acute inflammation, and testing this for themselves on cases other than inflammatory, noted some striking results which merit full investigation. The test is a gravity precipitation of four parts of blood drawn into a syringe containing one part of 5 per cent. citrate of soda solution. Into a glass, flat-bottomed, perfectly dry tube (60 mm. long, 5 mm. wide and marked at 6, 12, 18, and 24 mm. from the bottom) the mixture is poured to the 24 mm. mark and is allowed to stand. If the column of corpuscles shrinks to 18 mm. in less than half an hour there has been held to be severe inflammation, with the necessity of immediate operation. In testing this against kala azar, malaria, enteric fever, and tuberculosis it became, however, clear that these conclusions require modification in India, a point the consideration of which is reserved for a future paper; but the tests disclosed a "simple, quick and apparently reliable aid to the diagnosis of malaria from other fevers." In healthy men sedimentation was slow, the column never less than 23 mm. high after half an hour's standing, never so dark as in diseased conditions, and the supernatant fluid was cloudy and only a faint yellow. In

abdominal abscesses the column became shorter than 18 mm. in about 10 minutes, and was very dark. In kala-azar (parasites being found on hepatic or splenic puncture) sedimentation was rapid, the column being nearly always less than 10, and once becoming as short as 4 mm., the fluid was clear and colourless or faintly greenish. In typhoid the column was 13 to 15 mm. high, the fluid a cloudy white, In tuberculosis the column was 6 to 10 mm. high and the fluid cloudy and pale yellow. In malaria the column varied in height from 5 to 22 mm. with an average of 12 in cases where plasmodia were found, while the supernatant fluid was markedly yellow—golden, greenish or reddish. This brilliant yellow was present in all cases, whatever the species of parasite, and in no other condition, and is characterized as a most striking phenomenon. It was more intense in those actually suffering from fever than in others, was found in one man who had had no fever for a year, but who developed an attack a fortnight later, and generally disappeared from the citrated plasma of those who had had a few days quinine treatment, but not till then. So far as the tests have gone the colour varies with the species, golden yellow with *P. vivax*, greenish yellow with *P. falciparum* and reddish yellow with *P. malariae*. The fluid gives a very faint violet with Van den Bergh's indirect test for bile pigment and no colouration with the direct test. Spectroscopically it does not show haemoglobin or methaemoglobin bands, but a broad one in the blue-violet part. Conclusive evidence as to the cause of the colour has not been obtained.

C. L.

RAETZ (Erico). Paludismo a cuatro mil metros de altura. [**Malaria at an Altitude of 4,000 Metres.**] *Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 481–482.

In the lead mines of Pumahuasi, at an altitude of 4,000 metres, ten cases of malaria (comprising all three forms and presumably microscopically established) were detected. They are described as absolutely intolerant of quinine, but benefiting immensely from intravenous injections of hydrochloride of hydroquinine, which they received in 0.3 gm. doses with a total of 15 gm. in a month.

C. L.

MANDELSTAMM (Moritz). Ueber die Fieberkurve im Anfangsstadium bei primärer Malaria tertiana. [**Fever Curve in Early Stage of Primary Tertian Malaria.**]—*Deut. Med. Woch.* 1927. Apr. 8. Vol. 53. No. 15. p. 618. With 2 charts in text. [1 ref.]

The writer has seen in Leningrad, for some years past, cases of tertian malaria, established either by blood examination or concluded to be such by their reaction to quinine. It is held that the period of appearance, March to May, precludes local seasonal infection. All had sojourned during the previous year in South-East Russia and had taken during the summer 0·5 to 1 gm. of quinine once a week, and it is concluded that this has produced the long incubation period which is the writer's justification for naming them primary attacks. The point which is emphasized is that the beginning of the temperature curve shows an irregularly continuous temperature, a point which is new to the author [see this *Bulletin*, Vol. 22, p. 54, &c.].

C. L.

CLARK (Herbert C.). **The Comparative Incidence of Gametocytes in Untreated and in Briefly Treated Malaria. A Preliminary Report.**—*Amer. Jl. Trop. Med.* 1927. Jan. Vol. 7. No. 1. pp. 15–20. [8 refs.]

From April to September, 1926, that is in the dry and beginning of the rainy seasons, Clark examined about the Caribbean Sea 7,201 thick films by the Barber and Komp modification of Ross's technique. The average time spent in examining a slide was one minute. The positives were 29·8 per cent., the village index being 19·7 and the labour index 41·1. More than half the labour examined represented men found off duty in labour camps and three of such men were infected for every man at work. Anophelism was marked. The parasite percentage was—*P. falciparum* 76·6, *P. vivax* 18, *P. malariae* 2·5, mixed 2·7. The gamete rate was 13.5, but abundant gametes were rare. Of 124 cases examined after intensive quinine treatment for a week, 45·9 per cent. showed gametes.

"It is my belief that the degree and promptness of gamete invasion of the peripheral blood stream following a brief, vigorous use of quinine in estivo-autumnal malarial fever is not very generally known and that the long period over which many treated cases show a persistence of gametes in the peripheral blood is also not widely understood."

C. L.

PEYROT (J.). A propos du paludisme. [**Concerning Malaria.**]—*Jl. Méd. de Bordeaux.* 1927. Jan. 25. Vol. 104. No. 2. pp. 51–59. [28 refs.]

In this summary of recent work on malaria the writer mentions that the French Ministry of Pensions is adopting as a distinction between primary malarial attacks and relapses, the finding of gametes, this being held as characteristic in the latter. [Readers of this *Bulletin* will remember that gametes have been found among the first forms to appear in mosquito malaria deliberately induced in England for the treatment of general paralysis.] The presence of febrile syphilis is mentioned in those who have had malaria and the possibility of confusing congenital malaria with congenital syphilis.

C. L.

PLEHN (A.). Ein chininresistenter Tropikastamm. [**A Quinine-Resistant Strain of Subtertian Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. May. Vol. 31. No. 5. pp. 210–211. [4 refs.]

A sailor, H., who had for 3 weeks been taking 1 gm. of quinine twice weekly suffered, in Karachi, from fever which is reported to have lasted for 20 days in hospital in spite of quinine given in four-day periods with a day's abstention. About a month later he entered hospital in Hamburg with vesicular and crescent forms of *P. falciparum.* Under quinine 0·5 gm. and beprochin [plasmochin] 0.05 gm., evidence of malaria disappeared within 4 days. It is not clear for how long the drugs were continued, but relapse occurred and parasites disappeared under "chinitren" and beprochin. Apparently crescents persisted in spite of these three drugs as well as peracrina—all in unstated doses. From H. 2 cc. of blood were injected intravenously into Ki, a paralytic who showed his first gametes eight days after the first trophozoits appeared.

A second similar injection produced no appreciable effect on fever or on the numbers of plasmodia. Both disappeared spontaneously without quinine. Be. had had tertian malaria injected previously, which spontaneously disappeared; he was injected from Ki, and showed trophozoits and gametocytes, then reinjected from another strain without obvious change, and in him too there was apparent spontaneous cure. Bng. was injected subcutaneously from Ki, on the same day as was Be. He got fever and was, apparently without blood examination, given 0·5 gm. of quinine on two days and was then injected intravenously and subcutaneously from H. on three occasions. He was apparently given a half-gramme dose of quinine by mouth occasionally; for example, there seem to have been taken six such doses between 13th February and 6th March. From Bng. La. was injected intravenously with 3 cc. of blood and became infected. He, on the contrary, received treatment intramuscularly as the bihydrochloride, on days one and two 1·2 gm., day three 0·6, nine and ten 0·6, fifteen and sixteen 0·6 and thereafter by mouth 0·3 gm. every fifth and sixth days. It seems unnecessary to continue the detailed statement. The cases cited show the sort of evidence on which the presence of quinine resistance is based.

C. L.

VAN DEN BRANDEN (F.). Recherches sur la malaria congénitale, faites au Congo Belge (Léopoldville). [**Congenital Malaria at Leopoldville, Belgian Congo.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 338–342. [8 refs.]

In 55 cases the blood of the mother, of the placenta, and of the new born child was examined. Of the 55 mothers, 31 were infected with plasmodia and 4 with microfilariae. In one case only was the placental blood found infected, and, in that, quartan parasites were identified, although the mother's blood contained numerous schizonts of *P. falciparum* only. In no case was the child's blood found infected. It is pointed out that these observations are contrary to those of BLACKLOCK and GORDON at Freetown (this *Bulletin*. Vol. 23, p. 130.)

C. L.

FOÀ (G.). Su di un caso di Malaria in neonata di 27 giorni. (**A Case of Malaria in an Infant 27 Days Old.**)—*Riv. di Malariologia.* 1926. Sept.–Dec. Vol. 5. No. 5–6. pp. 660–662. [12 refs.] [English summary p. 739.]

The mother showed *P. vivax* on 11th July and *P. falciparum* on 11th and 23rd August and 2nd September. The child was born on 31st August, and, on 27th September, had fever with clear chills, was pallid, had palpable spleen and liver and showed growing rings of *P. vivax* without gametocytes.

C. L.

DEMJANOW (G. G.). Ueber den Malariaausschlag. [**A Malarial Eruption.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Feb. Vol. 31. No. 2. pp. 89–92.

Demjanow, an assistant in Professor NISHIBITZKI's clinic at Krasnodar, Kuban, describes a petechial eruption in malaria. It affected principally the hypochondria but might also be found on the whole abdomen, the

breast, neck, and inner aspects of the thighs and forearms. It was rose-red, symmetrical, sometimes grouped, and reappeared in relapses. At first diagnosis was clinical. When the microscope began to be used parasites were found in 75 per cent. of cases, 69 being subtertian and 6 mixed tertian and subtertian malaria. Two cases of comatose subtertian malaria had a typical purpura haemorrhagica lasting two weeks and disappearing with betterment in the condition.

C. L.

MESNARD, STEFANI & LE MEILLOUR. Un cas d'affection pulmonaire subaiguë simulant la tuberculose guéri par la quinine. [**Case of Pulmonary Affection simulating Tuberculosis, cured by Quinine.**] —*Bull. Soc. Path. Exot.* 1927. Feb. 9. Vol. 20. No. 2. pp. 113–116.

A subacute pulmonary affection suggesting incipient tuberculosis (but with no bacilli found) accompanied by schizonts of *P. falciparum* in the blood cleared up rapidly under "quinine," 2 gm. daily, "half of it by mouth." It is held permissible to consider that the plasmodium was involved in the production of the centrally situated pulmonary lesion which was detected by ordinary means and confirmed by X-rays.

C. L

REITANO (Riccardo). Contributo alla conoscenza delle alterazioni del sistema nervoso centrale nella malaria. [**Changes in the Central Nervous System in Malaria.**]—*Policlinico* Sez. Med. 1927. Feb. 1. Vol. 34. No. 2. pp. 49–59. With 1 text fig. & 4 figs. on 1 plate. [11 refs.]

A man of 35 was picked up on the public road and died shortly after admission to hospital, a diagnosis of left cerebral haemorrhage being made. The only microscopic lesions of moment were almost symmetrical softenings about the anterior limb of the internal capsule, that on the left being rather the more extensive. They had not the character of haemorrhages. Microscopically, the small vessels in the cerebral white matter generally were packed with plasmodia and pigment. Their endothelium showed granular and lipoid change as did the nerve cells in the frontal and temporal regions. In the subcortical frontal layer were circumscribed nodes of Dürck, always in relation to a capillary wall, not actually forming typical daisies but with a definite radiation from the vessel as centre. In the softened zones, cut vessels showed a network and, beyond this, careful search displayed necrotic, ill-staining areas with degeneration of nervous elements, perivascular lymphocytosis and fatty change.

C. L.

RUSSELL (E. V.). **A Case of Cerebral Malaria.**—*Jl. Roy. Army Med. Corps.* 1927. Mar. Vol. 48. No. 3. pp. 227–228.

A Lance-Sergeant, ill for 4 days with slight abdominal pain and a little vomiting, collapsed in bed and was taken to hospital, semi-concious, jaundiced, slightly cyanosed, incontinent. An acute abdomen was considered, but a film showed subtertian parasites in large numbers, Stimulants and a saline intravenous injection failed to bring back his pulse and he died four and a half hours after admission. The brain capillaries showed many, and the spleen enormous number of, subtertian parasites.

C. L.

BRESSOT (E.). Le masque appendiculaire de certaines formes de paludisme. [**Malaria simulating Appendicitis.**]—*Presse Méd.* 1927. June 4. Vol. 35. No. 45. pp. 707–708. [7 refs.]

During the last eight years, five patients have come under Bressot's care, apparently at Constantine, with symptoms of acute appendicitis having a sharp onset. There was acute abdominal pain, bilious vomiting, fever and abdominal tenderness particularly in the appendix region. Two refused operation, on recurrence of rigors were established as malaria by blood examination, and recovered completely under quinine. When, in the other cases, the abdomen was opened, the appendix was quite normal, and there was a striking hyperaemia of the intestinal wall which, it is said, appeared to affect the submucous coat of the end of the ileum and the large intestine. It is further stated that, in two, there were oedematous, ecchymotic, infiltrated plaques on the mucosa as big as a franc. In one, the mesenteric glands were enlarged. Four cases were infected with *P. vivax* and one with *P. falciparum.*

C. L.

GARRONE (Enrico). Perniciosa malarica a forma meningitica. [**Pernicious Malaria simulating Meningitis.** *Policlinico.* Sez. Prat. 1927. March 21. Vol. 34. No. 12. pp. 426–428. With 1 chart in text. [1 ref.]

The symptoms in question were rigidity of the neck, Kernig's sign and exaggeration of the patellar reflex, with mental dullness. Subtertian parasites were present in the blood, but not in excessive quantity. Oral and intramuscular quinine and cinchonine not relieving the condition during four days, a lumbar puncture was performed, with escape of fluid in a strong jet lasting for some time, and intravenous quinine was administered for four days. By this time recovery had taken place and administration by mouth was resumed.

C. L.

WALDORP (Carlos P.) & BORDO (Carlos A.). Las nefropatias en los palúdicos. [**Affections of the Kidneys in Malaria.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 368–377. [27 refs.]

Renal abnormalities in malaria are discussed. Simple albuminuria appears without symptoms except lumbar pain and shows itself with or immediately after the access, sometimes in as many as 50 per cent. of cases irrespective of form, disappearing under treatment. In subtertian malaria there may also be hyaline and granular casts. Parenchymatous nephritis is accompanied by degenerative changes of one kind or another, and by anasarca, oliguria, even haematuria, and abundant hyaline and granular casts. It may pass into amyloid degeneration. In connexion with this the writers draw attention to a rare condition perhaps sometimes overlooked] reported by a few observers, namely acute anasarca in recent malaria without renal lesion. They describe an acute haematuric globulonephritis; quote a case by QUARELLI where there was intermittent chyluria coming on during accesses in a case of subtertian malaria, bilharzia and filaria being excluded; and mention necrotic nephritis. There are finally considered the pathological renal conditions continuing during malarial attacks or appearing in chronic malaria.

C. L.

i. MacQueen (John). **A Case of Rupture of an Enlarged Malarial Spleen.**—*Lancet.* 1927. Feb. 26. pp. 437–438.

ii. Altounyan (E. H. R.). **Splenectomy in Malarial Subjects.** [Correspondence.]—*Ibid.* Apr. 16. p. 844.

i. A boy of 15 was admitted to hospital at Jaffa having walked into the reception room, from a carriage. He had been kicked in the abdomen, had collapsed and vomited. There was a history of recurrent attacks of fever. He walked bent, was pale and muddy in complexion, abdomen moved unnaturally. Diaphragmatic lesion and splenic rupture were considered. The condition worsening, laparotomy was performed. A central incision showed a large splenic tear and air was blowing in and out of the abdomen at the upper pole of the spleen. Suturing proved useless. Remembrance of the advice of a surgeon in Egypt that removal of the enlarged malarial spleen was followed by 100 per cent. mortality suggested gauze packing, with only partial closure of the wound. This was removed on the third day and the wound completely closed. Some pus, however, collected, but, the wound reopening, was discharged and complete recovery followed.

ii. The writer catalogues his last ten splenectomies, 7 for malarial splenomegaly with two deaths, one for splenic anaemia with death, one for "splenomegaly" with death and one for torsion of the pedicle, simulating ovarian cyst, in a malarial spleen weighing 4 pounds. If there be extensive diaphragmatic adhesions the operation is most dangerous. He has no evidence that the excision is of lasting value to the patient, nor does he feel that there need have been anything other than innocent sucking of air into the subdiaphragmatic pouch in MacQueen's case. C. L.

Gonzalez Olaechea (Max). El signo de Pagniello en el paludismo [**Pagniello's Sign in Malaria.**]—*Crónica Méd.* 1927. Jan. Vol. 44. No. 763. pp. 17–18.

Since 1921 the writer has looked for Pagniello's sign in 700 malaria cases and has found it in 90 per cent of them. The sign consists of exquisite tenderness in an intercostal space over the spleen, generally the ninth, less frequently in the eighth or tenth. [See this *Bulletin*, Vol. 17, p. 137.] C. L.

Hodson (V. S.). **Quinine and Malaria. A Plea for Moderate Dosage.**—*Kenya Med. Jl.* 1927. Mar. Vol. 3. No. 12. pp. 349–354.

Hodson points out that adult natives of malarial districts take malaria very slightly if at all, that a series of dry years with a failure in the "mosquito crop" followed by a wet year brings malaria, that blackwater fever is rare among natives, and that an Englishman suffering from exposure will develop an active from a latent malaria. He concludes that the resistance of the individual is the prime factor in combating malaria, and that quinine must be given so as to stimulate resistance. This, it is believed, may be attained by intermittent administration, and he details a scheme in which three or four days of quinine taken in two ten-grain doses and 3 or 4 free days follow one another for 21 to 3 months, the intervals being gradually extended at the expense of the quinine-taking days. The statement is in the nature of authority. Subjects are placed in three classes: (1) the local native with acquired protection, (2) the unprotected but healthily living European, (3) the unprotected visitor with some handicap, the worm-infested Egyptian serving as an example. C. L.

GUILLON (A.) & KÉRUZORÉ (A.). Quelques précisions sur la quinine et ses sels et leur emploi en thérapeutique coloniale. [**Employment of Quinine and its Salts in the Colonies.**]—*Ann. de Méd. et de Pharm. Colon.* 1926. Oct.–Nov.–Dec. Vol. 24. No. 4. pp. 513–531. [5 refs.]

Among much that is evidently a résumé of knowledge issued for the information of those in the French Colonial Service there are some points of general interest. In testing the disintegration of a tablet of quinine it is not sufficient merely to leave it in water. It may appear unaffected although on disturbance it may fall to pieces. The addition of weak acid in one case shortened the disintegration time to three-quarters. As a basis for tablets he tried a mixture of tartaric acid and bicarbonate of soda, but the mixture is too hygroscopic and "explosive." Hypodermic injection of quinine, mentioned as permissible in instructions issued by the Société de Pathologie exotique and forwarded to the Minister for the Colonies, is condemned. Of injection methods, that into the veins is held to be the route of election. It is surprising to find that the intratracheal route has actually been employed in times past. For the subarachnoid route a case of LE DANTEC's is quoted where 15 days' anaesthesia of the perineum and genito-urinary organs followed a dose of 2 to 6 cgm.; it requires further study.

C. L.

BRITISH MEDICAL JOURNAL. 1927. Apr. 9. p. 702.—**Resistance to Quinine in Malaria.** [Correspondence.]

Sir Humphrey ROLLESTON having, in his Presidential address to the Medical Society of London, referred to "the extremely resistant character of malaria to quinine treatment during the War in the Macedonian area," "I.M.S." (*Brit. Med. Jl.* 1927, Mar. 19th, p. 542) writing evidently with large experience from the Punjab, India, notes that cases, established by microscopic examination as having tertian or subtertian malaria, were mostly brought under rapid control by treatment with quinine sulphate. In practically all unyielding cases the urine showed no quinine. From the fact that exhibition of the hydrochloride or bi-hydrochloride invariably resulted in the appearance of quinine in the urine with fall in temperature, it is concluded that the lack of excretion under the sulphate signified lack of absorption. "R.A.M.C. Diploma in Tropical Medicine" from his own experience strongly backs "I.M.S." in his suggestion "that the so-called resistance to quinine is merely lack of absorption, as the [little soluble] sulphate has always been the chief preparation used everywhere on account of its cheapness."

C. L.

DE-VECCHI (Gino). Il chinino nelle malariche gravide. [**Quinine in Pregnant Malarial Patients.**]—*Policlinico.* Sez. Prat. 1927. Feb. 7. Vol. 34. No. 6. p. 207.

Of 400 malarial cases seen between April and November, 1926, 18 were pregnant. Fourteen were tertian infectious, two quartan, one subtertian and one abnormal. He cites one pregant woman who took quinine to the point of poisoning without terminating pregnancy and concludes that in all gravid women with malaria treatment should at

once be instituted, that the drug's ecbolic action is little or none in the first months of pregnancy; and that, later, quinine should be combined with an opiate.

C. L.

GUILLEMENT & DUVAL. Quatre cas de mort consécutive au paludisme aggravé par la grossesse. **Four Cases of Death from Malaria in Pregnancy.**]—*Ann. de Méd. et de Pharm. Colon.* 1926. July–Aug.–Sept. Vol. 24. No. 3. pp. 395–402. [1 ref.]

These four deaths are definitely attributed to pernicious accesses of malaria after delivery. In the first *P. vivax* was found, 2·5 gm. quinine was given intramuscularly in half-gramme doses and she died in convulsions. The second showed *P. falciparum* and died in hyperpyrexia after 4 gm. of quinine given intramuscularly and intravenously. In the third no plasmodia were found, 6 gm. of quinine were injected, and she died in hyperpyrexia with a large tender uterus and a purulent and stinking vaginal discharge. In the fourth *P. falciparum* was present, she had 3·5 gm. of quinine partly at least intravenously and 0·5 gm. of quinoform. She died unconscious.

C. L.

GIEMSA (G.). Ueber den Mechanismus der antimalarischen Chininwirkung. [**The Mode of Action of Quinine in Malaria.**]—*Muench. Med. Woch.* 1927. Apr. Vol. 74. No. 14. pp. 574–577. [26 refs.]

Giemsa concludes that it must be accepted that quinine acts directly on the malaria parasite, to which it is anchored and which it poisons; it is incapable of releasing specific immune body, but nevertheless is possibly favoured in action by its presence. Immune body is formed by means of the disintegrating parasites which have been killed by quinine.

[Warrington YORKE and MACFIE at the meeting of the Royal Society of Tropical Medicine and Hygiene held on 15th May, 1924 (this *Bulletin*, Vol. 22, p. 50) concluded—

"Quinine given to a patient whose blood contains numerous malaria parasites invariably destroys directly, or more probably indirectly, large numbers, but not all, of the parasites, thus setting free a considerable quantity of soluble antigen. The antigen provokes by stimulation of the host's tissues the formation of immune-body. The immune-body, if present in sufficient amount, destroys the remaining parasites, thus resulting in sterilisation of the infection and in the cure of the patient."

This paper is not among the 26 references quoted by the writer.]

C. L.

BEIHEFTE ZUM ARCHIV FÜR SCHIFFS– UND TROPEN-HYGIENE. 1927. Vol. 31. No. 1. 145 pp. With 73 charts in text & 12 coloured figs. on 1 plate.—Ueber Plasmochinbehandlung der natürlichen Malaria. [**Plasmochin Treatment in Naturally Acquired Malaria.**]

[MÜHLENS (P.) & FISCHER (Otto), FISCHER (Otto), ROEHL (W.), SCHULEMANN (Werner) & MEMMI (Guglielmo), EICHHOLTZ (Fritz), RADOJIČIČ (Mihajlo M.), DJOKIČ (Al.) & ŠTAMBUK (Dinko), POLYCHRONIADES (Georges), SLIWENSKY (M.)]

This book is contributed by 9 different writers. Their conclusions may be summarized. MÜHLENS writes that plasmochin is readily taken and well borne and is without the bitter taste of quinine, but that,

particularly in nervous patients, it produces cyanosis and abdominal pain with sometimes methaemoglobinaemia. Intoxication symptoms have not hitherto been recorded unless the daily dose reaches 0·18 gm. [in MANSON-BAHR's three cases reported in this number the daily dosage was 0·12 gm., 0·08 gm. and 0·12 gm.] In dose of 0·02 gm. 4 or 5 times a day, or of 0·05 gm., twice a day it is at least as effective as quinine in tertian and quartan malaria and seems to be followed less frequently by relapse. It has little effect on subtertian rings, and in this infection relapse is more frequent than after quinine. Plasmochin compound tablets are accordingly to be given in this infection (0·1 gm. plasmochin and 0·125 gm. quinine). Plasmochin is the first medicine which with certainty removes crescents from the blood within a few days and prevents their reappearance. [See, however, the report by BÄRMANN and SMITS in this number.] In several cases of quinine idiosyncrasy and of blackwater fever [which last is characterized as haemoglobinuria] plasmochin has been well borne and effective.

FISCHER deals with the prophylactic use of plasmochin and administration of plasmochin and quinine to sailors on a Hamburg-Bremen Africa Line steamer. It does not have seemed possible to control the experiments fully.

ROEHL in Spain confirms the action on tertian parasites and on crescents and its slight influence on subtertian schizonts. RADOJIČIČ writes in the same sense, as do DJOKIC and ŠTAMBUK, and POLYCHRONIADES and SLIWENSKY.

SCHULEMANN and MEMMI's contribution marks the fourth publication of their work, which is considered immediately below.

EICHHOLTZ finds that in dogs, cats and guineapigs intravenous injection of plasmochin in doses of 2 to 3 mgm. per kilogramme suppresses alternate systoles, the heart with higher doses becoming irregular. This action is lessened by adrenalin or quinine.

C. L.

MEMMI (Guglielmo) & SCHULEMANN (Werner). Sulla plasmochina, derivato sintetico della chinolina, rimedio antimalarico. (**On Plasmochin, a Synthetic Product obtained from Quinoline, as an Antimalarial Drug.**)—*Riv. di Malariologia.* 1927. Jan.–Feb. Vol. 6. No. 1. pp. 40–71. With 1 coloured plate & 20 charts. [Refs. in footnotes.] [English summary p. 191.]; also in *Policlinico.* Sez. Prat. 1927. June 20. Vol. 34. No. 25. pp. 883–885.

SCHULEMANN (Werner) & MEMMI (Guglielmo). Plasmochin, ein Synthetisches, gegen die Malariainfektion wirksames Chinolinderivat.—*Klin. Woch.* 1927. June 4. Vol. 6. No. 23. pp. 1093–1094. [1 ref.]

Under the same title these papers, together with one mentioned just above by the same writers, all deal with the same work, the first and that in the Beihefte being full accounts with protocols. The writers have treated about 120 persons with plasmochin, the dose being, for tertian and quartan malaria, 0·02 gm. in a tablet three times every day for a week and thereafter on the last three days of following weeks for five more. All stages of these parasites are affected and disintegrated by the drug. The fever disappears in one or two days and the parasites in 5 or 6, quartan being

more resistant than tertian malaria. For *P. falciparum* infections plasmochin has little effect on the asexual, but a marked one on sexual forms. It does not, then, replace quinine in subtertian malaria but is a remedy against crescents. It is, however, given in considerably larger doses than for the other plasmodia namely two tablets (0·04 gm.) three times a day continued daily for a fortnight. Thereafter a two-days' pause and four days similar administration ; a repetition of this ; a three-days' pause and 4 days like dosage ; a repetition ; a four-days' pause and three days like dosage. An alternative treatment is the mixed tablet containing 0·01 gm. of plasmochin and 0·125 gm. of quinine sulphate. Splenomegaly is rapidly reduced. The statement that plasmochin is valuable in blackwater fever seems to be a pious repetition, as certainly are those which, following MÜHLENS, incorrectly attribute the cyanosis to nerve stimuli, and announce that it has never been fatal. It may induce abdominal pain. The urine never showed albuminuria [and so presumably never methaemoglobinuria.]

C. L.

BÄRMANN (G.) & SMITS (E.). Ueber Plasmochin. [**Plasmochin.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1927. Vol. 67. No. 1. pp. 151–158.

A tablet of plasmochin (0·02 gm.) or of plasmochin compound (plasmochin 0·01 gm. and quinine sulphate 0·125 gm.) was given four times daily for 14 days. Plasmochin was given to 11 tertian and one quartan case. Parasites disappeared in from 3 to 80 hours (average 36), the spleen diminished and the haemoglobin improved ; no relapses within 80 days. Plasmochin compound was given to 3 tertian cases. Two remained free over an observation period of 70 days ; one relapsed in 50 days. Plasmochin was given to 9 subtertian cases observed for 80 days. One remained without relapse, 1 relapsed after 60, one after 50 and three between 1 and 30 days ; that is to say, in one instance, parasites never left the blood throughout a month's treatment. Of these 9 cases, 7 were without crescents at the beginning of treatment. Of these 7, crescents appeared at the first relapse in 3, and in 1 of them at each of two more relapses which occurred after administration of plasmochin compound. It is concluded that plasmochin is useless in infection by *P. falciparum,* it does not necessarily prevent the appearance or reappearance of crescents in relapses. They have even appeared in the blood during treatment, after it had been continued for 120 hours. Plasmochin compound was given to 8 relapses. Of these 6 remained free from further relapse for 30 to 60 days ; one case relapsed twice under this treatment, with crescents during actual treatment and these as well as schizonts remained visible in the blood for 30 days in spite of 14 days' treatment with plasmochin compound—4 tablets daily. One case died.

Weight 48·4 kgm., haemoglobin 70, pulse 68, spleen 1 finger, no albumin, one subtertian ring in four fields. Treatment, plasmochin 0.02 gm. 4 times daily. On the third day he had some cyanosis, became unconscious, temperature 39·2° C. [102.55° F], leucocytes 16,000, albumin without casts. He was given quinine intravenously and intramuscularly with disappearance of parasites from the circulation, but he died next day with a rapid fall in temperature and with a crescent in the blood. No malaria parasites were found except some crescents in the spleen. The liver showed patchy, fresh, and very slight necrosis.

C. L.

MANSON-BAHR (Philip). **The Action of Plasmochin on Malaria.**—*Proc. Roy. Soc. Med.* 1927. Apr. Vol. 20. No. 6. pp. 919–925 (Sect. of Trop. Dis. & Parasit. pp. 33–39.) [5 refs.]

Manson-Bahr describes ten cases of tertian, six of subtertian and two mixed infections treated with plasmochin; and five of tertian and five of subtertian treated with plasmochin compound. Of the tertian cases all are reported as doing well, without known relapses. Of the six subtertian cases two relapsed, one while the treatment was being carried on; two developed methaemoglobinaemia, in one case intense; two were cured. Of the mixed cases one developed "cyanosis" with methaemoglobinuria, and the other relapsed with benign tertian malaria six months later. Those treated with the "compound" tablets did well. The rate in contraction of the spleen was most marked. Manson-Bahr characterizes the "cyanosis" as undoubtedly toxic, developing with great suddenness, first observed on the mucous membrane of the lower lip, the palate, gums and finger nails being shortly involved. The face is livid grey. There is no dyspnoea nor undue distress. Two patients complained of curious clammy sweats, abdominal pains and a bruised sensation over the lower ribs. The blood was chocolate-brown with methaemoglobin. In one case the symptoms came on after 0·4 gm. plasmochin in daily doses of 0·12 gm. Methaemoglobinuria appeared within 24 hours of the "cyanosis," with albumin and amorphous casts. "The attack resembled a mild blackwater fever which ran a favourable course." These blackwater symptoms lasted two days and were accompanied by typical haemolytic icterus, by destruction of one and a half million red corpuscles per cmm. of blood and by disappearance of malaria parasites from the blood during the attack. The "cyanosis" lasted only 24 hours. In the second case the lividity came on after 0·24 gm. (0·08 gm. daily for 3 days) and lasted for seven days. In the third it was slight but epigastric pain was considerable. The total dosage had been 0·4 gm., and the daily 0·12. In discussion Dr. HENNINGS on behalf of the manufacturers put the proper dose as 0·06 gm. daily. [MÜHLENS himself is evidently using 0·08 to 0·1 gm. daily.]

C. L.

EISELSBERG (Karl P.). Plasmochinvergiftung. [**Plasmochin Poisoning.**]—*Wien. Klin. Woch.* 1927. Apr. 21. Vol. 40. No. 16. p. 525. [3 refs.]

A medical man from America who came to Vienna for a persisting pemphigus conjunctivae (for which he had endured six operations and a year in a dark room) and had never had malaria, yellow fever or syphilis, received plasmochin apparently on chance. Between 29th November and the morning of 2nd December he had 10 pills of plasmochin, or 0·2 gm. in all. He was by that time yellow, weak, with much epigastric pain, and, after the last pill, vomited and lost consciousness. His temperature was 39·6 [103·3°] and the urine deep brown. He came under the care of Eiselsberg next day. He was still vomiting but not bringing up blood. Urine dark brown with brown sediment and giving the guaiacum test, even when diluted 500 times; much albumin; red corpuscles; an occasional leucocyte; no casts. Liver very tender; spleen two fingers. Red corpuscles 2,400,000 with poikilocytosis and anisocytosis. By 6 p.m. the red corpuscles numbered 1,550,000; the serum was brownish red with a strong direct bilirubin reaction and with urobilin strongly positive.

Blood transfusion and dextrose improved matters. On 4th December the red corpuscles numbered 1,300,000, the whites 15,700; on 5th, methaemoglobin was spectroscopically established in the urine, apparently the first spectroscopic examination made. Rapid improvement followed.

It is noted that the amount of plasmochin was far under the permitted daily dose of 0·15 gm. and that there was not the slightest sign of the circulatory disturbance suggested by MÜHLENS to account for the cyanosis.

C. L.

RAYNAL (J.). Contribution à l'étude du stovarsolate de quinine dans la tierce maligne. [**Stovarsolate of Quinine in Subtertian Malaria.**] —*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 408–413. With 1 chart. [2 refs.]

A man of 21, called up for military service and sent to Syria, dropped his prophylactic quinine and developed malaria, for which he was treated by quinine in unstated doses for 12 days. His temperature had reached 41·6° C. [106·9° F.] He was invalided. On reaching Beyrouth, *Plasmodium falciparum* was found, a few schizonts and some crescents, red corpuscles 3,038,000, haemoglobin 65, large mononuclears 22 per cent. He was given four successive courses of stovarsolate of quinine by mouth each lasting ten days and comprising the taking of four 0·25 gm. tablets daily. Five days separated each course. Schizonts disappeared from the peripheral blood within 36 hours. Crescents increased per thick drop from 57 to 649 at the end of 8 days, dropping to 194 after three more and disappearing during the third course. Stovarsolate of quinine contains equal parts of quinine and stovarsol.

C. L.

FREIMAN (Mark). **Stovarsol in Treatment of Malaria.**—*Jl. Trop. Med. & Hyg.* 1927. May 16. Vol. 30. No. 10. pp. 127–128. [6 refs.]

Stovarsol was given in adult doses of 16 grains (four tablets) to 68 cases of infection with *P. vivax*, 20 of *P. malariae* and 5 of *P. falciparum*. In accordance with the experience of others it had no effect upon either of the last two forms. It must be held to have cured the others. In acute cases it was given in full dose until the blood became negative (two to six days) and thereafter uninterruptedly for 21 days; in chronic cases in courses, up to three, of 21 days with 10 days' intervals between courses. Cases were not held cured unless the haemoglobin and blood cells had returned to normal and there had been no attack for three months.

C. L.

TARDRES (J.). Le stovarsol dans le paludisme. [**Stovarsol in Malaria.**] —*Arch. Inst. Pasteur d'Algérie.* 1926. Mar. Vol. 4. No. 1. pp. 49–52.

Reminding readers that stovarsol is inefficient in infection with *P. malariae* and *P. falciparum* and that even in those with *P. vivax* it does not cause splenic shrinkage as does quinine, Tardres describes two cases of the last infection, mother and child, treated with stovarsol, the courses lasting 73 and 83 days respectively. The mother relapsed 7 days after cessation of treatment, and the daughter 14.

C. L.

GABARROU (Felix G.). Acción del Stovarsol por vía digestiva sobre el *Plasmodium vivax.* [**The Action of Stovarsol by Mouth on** *Plasmodium vivax.*]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 363–367. [11 refs.]

Thirty-six cases of tertian malaria were treated by stovarsol, 1 gm. daily to adults to a total of 9 gm., 0·5 gm. to children. No ill effects followed; within 8 hours the gametocytes and large schizonts were affected, and within 24 hours parasites had disappeared. Relapse occurred within 35 days. The rapid prophylactic effect, by action on the gametocytes, is particularly mentioned. The drug had no effect on the subtertian or quartan parasites.

C. L.

GUÉRIN (F.), BOREL (E.) & ADVIER (M.). Stovarsol et paludisme. [**Stovarsol and Malaria.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 331–337. [3 refs.]

The writers report the effects of stovarsol treatment in ten cases of *P. vivax*, five of *P. falciparum*, three of *P. malariae* and one of a mixture of *P. vivax* and *P. falciparum*. As in the experience of others, the drug was ineffective in ridding the blood of plasmodia except *P. vivax*. With the last, disappearance was rapid but relapse within two months was the rule. It is judged that relapse and not reinfection was concerned, seeing that the predominant local infection was with *P. falciparum*, and that in all the reappearing attacks *P. vivax* alone was concerned. On the other hand the writers make what appears to be a new observation, that against *P. malariae* and *P. falciparum* stovarsol forms a remarkable adjuvant to quinine. They note also a point, first observed by SINTON, that about 18 hours after administration there is a sharp rise in temperature attributed by him to massive destruction of the grown parasites. They agree; since this rise does not occur in non-malaria cases nor in infections with *P. falciparum* or *P. malariae*.

C. L.

DE MELLO (Froilano) & VERNENCAR (H. M. P.). Effets du traitement par la *Smalarina Cremonese* sur six malades atteints de malaria chronique avec récidives fébriles (Ire communication.)—[**Treatment by Smalarina of Six Cases of Chronic Malaria.**]—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 323–330.

The authors describe six cases of treatment with smalarina, as far as possible the full treatment of 120 tablets over 30 days. The drug sometimes produced nausea and vertigo or even vomiting and headache. In no case did parasites disappear from the blood. In every case quinine and arsenic were needed. The drug was demonstrated as valueless whether as a parasiticide, or, so far as blood examination and the general state showed, as a means of increasing the patient's resistance.

C. L.

PERONI (Giacomo). Relazione finale su esperienze di immunizzazione preventiva e curative della malaria col metodo del Prof. Guido Cremonese. [**Final Report upon the Cremonese Method in preventing and curing Malaria.**]—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1927. Apr. Vol. 8, No. 4. pp. 206–208. With 1 folding plate.

Smalarina was administered for a whole year, from 1st December, 1925, to 30th November, 1926, according to CREMONESE'S formula to 39 chronic malarias who were sceptical but were finally inspired by a personal example in high quarters. Not one of the 39 lost a single day's work during 1926 [the periods do not correspond] although, they said, they had lost 1,009 days from malaria during the previous year. However 36 chronic malarias not taking smalarina admitted to losing 73 days work during 1926 and 1642 days during 1925 [in no case is a blood examination mentioned, nor are any details given as to methods of selection, control, or reward of those concerned.]

C. L.

TESIO (Fausto). Il valore terapeutico e profilattico della cura Mercurio-Antimoniale della malaria. [**The Therapeutic and Prophylactic Value of the Mercury-Antimony Cure in Malaria.**]—*Malariologia.* Naples. 1927. Apr. 15. Ser. 3. No. 1. pp. 12–16.

The Director of the Italian Hospital at Salt in Transjordania, contrary to the experience apparently of all others who have reported independently on smalarina, writes regarding a village of 450 inhabitants. Of these, 237 appear to have been treated with smalarina from September, 1924 to March, 1925. The number who reported six to twelve months after treatment was 206. Of these 3 were unaffected, 14 relapsed and 189 were cured. [See also this *Bulletin*, Vol. 22, p. 819 and Vol. 23, pp. 144 and 823.]

C. L.

FRONVILLE (G.); DUPUY. Quelques observations sur l'action de la peracrina dans la malaria. [**Action of Peracrina in Malaria.**]—*Bull. Méd. du Katanga.* 1926. Dec. Vol. 3. No. 4–5. pp. 151–153.

Fronville describes three cases treated with peracrina in the European Hospital, Elizabethville. In one patient malaria parasites were never found, but she was held to be suffering from chronic malaria. She had six tablets daily for a month and refused more on account of the gastric disturbance induced. In the second, who showed crescents, a peracrina followed a quinine course, but had to be abandoned on account of gastric trouble, though a second course [perhaps after a second course of quinine] was well borne [she was in hospital, so presumably took the tablets] and after 6 injections of neosalvarsan she left hospital in splendid health. In the third, after a four days' course in a man with "numerous malaria parasites," quinine had to be given. He had apparently taken a month's course of 6 tablets of peracrina daily before this. Dr. Dupuy curtly notes regarding the negro hospital in Elizabethville that his efforts to use the drug were all interrupted by colic and diarrhoea. [See this *Bulletin*, Vol. 23. p. 144, 823.]

C. L.

FISCHER (Otto). Experiencias en la malaria con paludismol. [**Trial of Paludismol in Malaria.**]—*Semana Méd.* 1927. Jan. 27. Vol. 34. No. 4 (1724). pp. 250–253. With 5 charts in text.

Paludismol is a yellow liquid, of disagreeable smell and a taste both acid and sweet. It is described as containing extracts of *Senecio salignus*, *Loeselinia coccinea* and *Calliandra grand. flora*. It was sent from the Argentine by request of MÜHLENS and tested by Fischer on seven cases of tertian and two cases of subtertian malaria. No therapeutic action could be attributed to it in the treatment of malaria.

C. L.

REITLER (Rudolf). Ueber die Cadmiumbehandlung der Malaria. [**The Cadmium Treatment of Malaria.**]—*Wien. Klin. Woch.* 1927. Mar. 10. Vol. 40. No. 10. pp. 314–317. [8 refs.]

Cadmium was used in one of three forms. A 1 per cent. watery solution of cadmium sodium tartrate for intravenous injection in dosage of 2·5 cc. described as efficient but toxic; 719d v. Heyden of unknown composition, given intramuscularly in doses of 0·5 to 1 cc. on 3 consecutive days and proving valueless in five cases; and cadmiol, a suspension in oil of cadmium subsalicylate with a 5 per cent. cadmium content, 1 cc. given intramuscularly every third day. It produces pain for some three days and was apparently used in all the 20 cases described. Of these ten were tertian. Two remained free from parasites during observation periods of 3 to 7 weeks; in 5 parasites returned in 12 days, 1 month, 1 month, 7 weeks, 6 days; in three they never disappeared and in one fever returned without parasites. In three quartan cases parasites either did not disappear for 5 weeks or, after a primary disappearance, reappeared in a few days. In five subtertian cases, two showed no parasites over observation periods of one and six weeks, one relapsed in the fourth week and in two parasites persisted throughout. All the cases were hospitalized which perhaps suffices to explain all the reported improvement. The effects of continuing quinine with cadmium are also reported.

C. L.

WALDORP (Carlos P.). El sulfato de berberina utilizado como medio diagnóstico y terapéutico en el paludismo latente. [**Sulphate of Berberine as Diagnostic and Therapeutic Means in Latent Malaria.**] —*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 355–359. With 3 charts. [1 ref.]

The writer strongly advocates berberine as a provocative in the diagnosis of latent malaria. Its specific action in reducing splenomegaly is held to give it a great advantage when associated with the drugs ordinarily used in the treatment of malaria. One illustrative case is given.

A man with a history of quartan malaria was given 1 gramme of quinine daily for 3 days, 0·75 gm. for 3 days and thereafter 0·25 daily till discharge (date unstated). Readmitted shortly for recurrence he had ten intramuscular injections of quinine (quantity unstated) and four tablets daily of of treparsol. Discharged he again shortly returned to hospital and received two 0·3 gm. injections of neosalvarsan. These induced vomiting and hyperpyrexia and resulted in his discharge as an incurable malaria. Coming under the observation of the writer no parasites nor fever were

detected until he had for a week taken a daily dose of sulphate of berberine. Then first simple and afterwards double quartan infection was clinically and microscopically established. The first injection of quinidine caused the disappearance of parasites and fever. Presumably it was continued. At least the spleen contracted and there was no recurrence during two months' observation.

C. L.

FISCHER (Otto). Ueber einige angebliche Malariamittel. [**Some Alleged Malarial Remedies.**]—*Muench. Med. Woch.* 1927. Mar. 25. Vol. 74. No. 12. pp. 483–488. With 11 charts in text. [14 refs.]

Certain therapeutic tests were made with the following drugs—"Chininphytin" the quinine salt of inosithexaphosphoric acid containing 58 per cent. of quinine base, cinchonine, bismuth, antimony, Albert 102, peracrina 303, elevosan and paludismol (see p.). It is concluded that cinchonine, Albert 102 and peracrina 303 have an antimalarial effect less powerful than that of quinine and do not form practical substitutes, that paludismol and elevosan are useless, and that only one is as valuable as "quinine" namely "Chininphytin," which, however, is after all a quinine salt. Antimony had no evident influence on crescents.

C. L.

HEYMANN (P.). Du traitement des rates paludéennes par la radiothérapie. [**Treatment of Malarial Spleens by Radiotheraphy.**]—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo,* 1925. Vol. 1. pp. 867–889. [7 refs.]; also in *Jl. de Radiol. et d'Electrol.* 1926. Nov. Vol. 10. No. 11. pp. 481–492. [7 refs.]

Sixteen cases of X-ray therapy are described in detail. The rays, used over the spleen, cause nearly always a leucopenia with a relative decrease in the large mononuclear leucocytes and an increase in eosinophils. In chronic cases the effect on splenomegaly is inappreciable. In acute cases, which have improved, heavy dosage is dangerous, and it is held that, taking into consideration the length of treatment and its difficulties and inconveniences, it should be rejected in favour of that by quinine and arsenic.

C. L.

i. KINGSBURY (A. Neave). **Some Investigations of Malarial Fevers. IV.—The Complement Fixation Reaction.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. Vol. 20. Nos. 5 & 6. pp. 359–364. [4 refs.]

ii. MANSON-BAHR (Philip). **Researches upon the Production of Malaria Antigen for a Complement-Deviation Test.**—*Ibid.* July. Vol. 21. No. 1. pp. 63–67. [9 refs.]

i. None of the complement fixation tests employed for such chronic affections as tuberculosis, hydatid disease and schistosomiasis have proved comparable with the Wassermann reaction, but, by reducing the dose of complement to a minimum and by employing a suitable

antigen, some success has been obtained. In such conditions the efficacy of the test centres round the discovery of a sensitive and highly specific antigen of low anti-complementary power. Eleven antigens were tested, eight from the spleen, liver, heart, brain and blood of a subtertian infected patient who died comatose after a single quinine injection, and three from the blood of one, $\frac{1}{16}$ of whose corpuscles were infected with *P. vivax*. The most satisfactory antigens were saline emulsions of washed and lysed blood. The results these gave were as follows. Of subtertian malarias, 25 were tested with *P. falciparum* antigen and 48 per cent. were positive (graded as 1 to 4); while 16 were tested with *P. vivax* antigen with 31 per cent. positive. Again, of tertian malarias, 12 were tested with *P. falciparum* antigen with 50 per cent. positive, and six with *P. vivax* antigen with 67 per cent. positive.

ii. Since FAIRLEY, in 1919, had shown that, in schistosomiasis, a specific antigen could be obtained from the larval stage of the parasite in the intermediate host, Manson-Bahr began, in 1920, an attempt to obtain a specific antigen from the oöcysts of plasmodia contained in the stomachs of *Anopheles maculipennis*. The paper describes how by the aid of JAMES and GILL, he obtained with great difficulty an antigenic extract from the stomachs of 26 anopheles. He next attempted to obtain the oöcysts of the bird malaria parasite in *Culex fatigans* working partly upon two infected canaries forwarded by Ed. SERGENT from Algiers, partly upon a shipment of 100 Bombay sparrows. In both cases the birds which reached London were but little infective to Culex, and only 24 infected stomachs were obtained. Using this combined material, no evidence of fixation of complement was obtained. It is believed that success can be attained, but only if antigen is sufficiently strong—at least 100 stomachs to 1 cc. of absolute alcohol; and it is suggested that the experiments should be repeated in a country where both anopheles and malaria abound.

C. L.

REATEGUI (Jorge V.). La hiperalbuminosis del liquido céfalo-raquideo en el paludismo. [**Excess of Albumin in the Cerebrospinal Fluid in Malaria.**]—*Crónica Méd.* Lima. 1926. Nov. Vol. 43. No. 761. pp. 314–321; 1927. Jan. & Feb. Vol. 44. Nos. 763 & 764. pp. 18–25; 54–61. [5 refs.]

In view of varying statements, the author's first task was to determine the normal albumin content in cerebrospinal fluid. Ten cases were examined and the content varied between 12 and 25 parts per 100,000. He accordingly took 30 parts per 100,000 as the normal maximum. He proceeded to examine this point in 30 malarial cases, microscopically established and comprising all three species, and found that the content lay between 80 and 100 parts per 100,000 in hyperacute cases, between 75 and 90 in acute, and between 60 and 70 in more ordinary cases. The administration of quinine had no appreciable effect on this, and its relation to acuteness of symptoms seemed to suggest a meningitis. It was not possible to determine how soon this albumin excess appeared nor how long it lasted. Globulin was in small quantity only. No relation was detected between the amount of albumin and of cellular elements. As judged by its rate of expulsion, the pressure of the cerebrospinal fluid was raised.

C. L.

MAYR (Julius K.). Die Wassermannsche Reaktion bei der Malaria. [**The Wassermann Reaction in Malaria.**]—*Med. Klin.* 1927. Jan. 21. Vol. 23. No. 3 (1154). pp. 94–95. [10 refs.]

After citing some of the literature, there are considered 80 cases of injected malaria. In 20 per cent. of these the Wassermann reaction, which a previous course of salvarsan had rendered negative, became positive during the malaria and disappeared later. It is concluded that if parasites are not found and the patient is free from fever a positive reaction signifies syphilis.

C. L.

YAMANAKA (S.). Einige klinische Untersuchungen ueber die Malaria. I. Mitteilung. [**Clinical Investigations in Malaria. Part I.**]—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1926. Sept. No. 258. German summary pp. 3–4. [In Japanese.]

The German summary states that the excretion of total nitrogen increases during fever. The excretion of urea runs parallel with it. Nitrogen as ammonia is commonly increased during fever and falls for some days after. Ehrlich's test gives urobilinogen in 90 per cent. of malaria cases, the reaction being unquestioned in 70 per cent., and lasting for some days. Urea and the residual nitrogen are generally increased in the blood in malaria, but not so ammonia except in coma. Bilirubin is generally increased in the serum ; van den Bergh's reaction was delayed, except in one case where it was immediate.

C. L.

BARDUCCI (Aldo Vincenzo). Lo sviluppo dei gameti di individui chininizzati nella zanzara trasmettitrice. (**The Development of Gametocytes in Mosquito Vectors infected from Quininized Patients.**)–*Riv. di Malariologia.* 1926. Sept.–Dec. Vol. 5. No. 5–6. pp. 594–612. [14 refs.] [English summary p. 738.]

The writer has fed specimens of *Anopheles claviger* on one case of subtertian, one of quartan and one of tertian malaria who had had quinine at greater or less intervals, and on three cases of tertian malaria who had had no quinine. Development of the sexual stages took place readily in the latter and either not at all or unsatisfactorily in mosquitoes fed on those who had had quinine. It is considered unquestionable that the failure to develop was due to the quinine.

C. L.

TURCU (Titus). Die zeitliche Verteilung und das Mengenverhältnis der Makrogameten und Mikrogametozyten bei menschlicher und Vogel-Malariainfektion. [**Appearance and Relative Numbers of Macrogametes and Microgametocytes in Human and Avian Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. May. Vol. 31. No. 5. pp. 212–232. With 8 charts. [24 refs.]

The writer finds in 30 cases of treated human malaria that female gametocytes were more numerous and more variable than male, which were never seen alone, although female forms were so seen at the beginning of the period during which sexual forms were present ; and at the end if there had been treatment, though both sexes were present equally if there had been none. Indeed sometimes males predominated

in either circumstance. Under provocatives, such as adrenalin and spleen douching, gametocytes appeared in 48 hours in tertian and after ten days in subtertian malaria, the former showing a tertian and the latter an irregular rhythm. Both sexes were present. In bird malaria the sexual forms ran parallel with the degree of illness; females being usually in excess, but males being more numerous in heavy infections.

C. L.

BIANCHI (Andrés E.). Notas sobre hematologia del paludismo. [**The Blood in Malaria.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. Nos. 14, 15 & 16. pp. 422–455.

The leucocytic formula used is very complex. Neutrophil polymorphonuclears are classified in three categories, lymphocytes in three and monocytes in two. Pathological lymphocytes are described in 65 of the 85 cases examined and in numbers varying from 1 to 18 per cent. In the instance last quoted they were subdivided into neutrophil metamyelocytes, monocytic haemoplastic cells, endothelial cells, Turk's cells, while other subdivisions are neutrophil myelocytes, polychromatophil erythroblasts, Rieder's cells, eosinophil metamyelocytes and lytic polymorphonuclears.

C. L.

GRIGORIEVA (S. P.). [**Costa's Novocaine—Formalin Reaction in Malaria.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 3. pp. 140–141. [In Russian.]

Costa's reaction was tested in 150 cases of benign tertian fever. The method is applied as follows: to 1·5 cc. of 2 per cent. solution of novocaine in saline are added 3 drops of 5 per cent. sodium citrate and 3 drops of the blood to be tested. The mixture is centrifuged, and 1 drop of pure formalin is added to it. A positive reaction is manifested by the appearance—not later than 15 minutes after the addition of the formalin—of turbidity in the lower half of the test-tube. Positive results were obtained in all the 150 cases examined at different stages of the disease and treatment. The reaction was most marked in acute and chronic cases, but gradually diminished during the course of treatment. It persisted, however, to a certain degree even after treatment was discontinued and the parasites had disappeared from the circulation. [Control experiments were apparently not conducted.]

C. A. Hoare.

PEREKROPOFF (G. J.). Zur Frage der atypischen Entwicklung der Parasiten der tropischen Malaria. [**Atypical Development of Parasites of Subtertian Malaria.**]—*Cent. f. Bakt.* I. Abt. Orig. 1927. June 8. Vol. 102. No. 8. pp. 432–449. With 101 figs. on 3 plates. [21 refs.]

The writer returns to the question of aberrant forms of plasmodia (*ante*, p. 276)—this time to those of the subtertian parasite. Three plates display 101 such forms, which are divided into five groups. They were derived from three patients, largely apparently from one who was treated intravenously, 0·04 gm. for a dose, with cyodin or cyadin (or both if they are different) which treatment did not lessen the number of parasites but somewhat diminished, it is claimed,

the alkalinity of the blood. From these preparations, it is claimed, there have been demonstrated in the blood of man not merely schizonts but also sporogony—zygocysts and oöcysts. The reviewer has identified, but only from the legend accompanying the plates, the figures which are considered to represent these forms.

C. L.

FRANCHINI (Giuseppe). E il maiale ricettivo all' infezione malarica? (Osservazioni sperimentali.) [**Is the Pig Susceptible to Malaria?**]—*Arch. Ital. Sci. Med. Colon.* Tripoli. 1927. Jan. Vol. 8. No. 1. pp. 7–11.

Nine young pigs were intramuscularly injected with *P. vivax* blood and four 6 times similarly injected with blood containing *P. falciparum.* Subsequent blood examinations of the injected pigs were not infrequent. On one occasion only were any parasites found. Nineteen days after injection with *P. vivax* two gametes were identified in a thick drop, though none were found in four further examinations.

C. L.

STEEL (John P.) & NICOLE (J. Ernest). **Malarial Therapy in General Paralysis of the Insane. A Review of Three Years' Work.**—*Lancet.* 1927. Mar. 5. pp. 484–486.

From the mental standpoint the malarial treatment of general paralysis has fully justified itself at Winwick. Since it was instituted over 3 years ago 28 persons have not received it: all are dead. In thirteen it could not be induced: all are dead. Of 120 in whom infection occurred ten are recent; of the others, twenty-six have been discharged, and five readmitted. Some at least of the other discharges are in good mental health. Moreover those who have not shown such marked mental recovery or remission almost invariably become clean, in itself a sufficient warrant for the treatment. It is no longer held that the more numerous the rigors obtainable the better the prognosis. Seven or eight rigors are held usually sufficient; many have less, the average number at Winwick having been seven. From the malarial standpoint, the average incubation period, whether in natural or injected cases, has been about 12 days. In natural infections parasites are usually found in the blood two or three days before pyrexia; in unnatural infections pyrexia precedes demonstrable parasites. Concomitant with the incubation anaemia and, prior to the first rigor, small rises in temperature seldom reaching 100° F. may yet indicate the febrile type of the oncoming paroxysms. Second attacks of induced malaria have often been very difficult to establish, particularly by inoculation; this immunity appears to be biochemical; moreover spontaneous remission is in them almost the rule, pyrexia disappearing before the parasites, so much so that "when a patient shows a spontaneous remission in what is regarded as the primary attack, it is enough to make one almost certain that he has previously had malaria." Second infections are less trying than primary ones except in those who in the intervening period have become excessively fat. In such they are absolutely contra-indicated. Of thirty cases reinfected because first attacks were therapeutically disappointing, three have been discharged, 4 are doing really well and 5 show improvement.

C. L.

NICOL (W. D.). **The Care and Management of Induced Malaria.**—*Jl. Mental Sci.* 1927. Apr. Vol. 73. No. 301. pp. 209–217. With 3 charts in text.

This report deals with 310 cases treated by mosquito-induced malaria at Horton, or produced by mosquitoes infected at Horton. The report to some extent, then, overlaps that of JAMES [this *Bulletin*, Vol. 23, p. 804]. The fatality rate during or immediately following the malaria course has been 6 per cent. Infection is induced in bed [probably in the dusk present under bedclothes] by four or five infected mosquitoes in a small glass jar whose mouth is closed with mosquito netting, the mouth of the jar being placed against the thigh and the anopheles biting through it. The incubation period is usually 12 (10 to 24) days and patients are kept in bed during it, for (1) warmth favours development of plasmodia, (2) rest tends to eliminate the odd rises in temperature to which general paralytics are prone, (3) accidents must be prevented since quinine during the incubation period does not prevent the access. The attack is divided into three stages. (*a*) Initial with subcontinuous or irregularly remittent fever during which parasites are rarely found even in thick drop until the second or third day. (*b*) The developed stage with nearly always a *daily* attack of fever. Parasites become numerous but "it is seldom easy to correlate the course of the temperature with the stages of growth of the parasites." Great care is exercised in this stage, the temperature being taken every fifteen minutes and a blood examination made every day. By cold sponging the temperature is kept below 105° F. [40·5° C.]. Quinine is given if more than 25 parasites are found in 25 fields of a thin smear using $\frac{1}{12}$ in. oil immersion and No. 2 eye-piece, or if clinical symptoms (persistent vomiting, faintness or collapse, cyanosis, seizures, undue restlessness, albuminuria, or the slightest suggestion of jaundice) indicate. In these circumstances, and if the full number of paroxyms desired for relief of the mental condition have not been reached, one dose of 5 gr. [0·3 gm.] of quinine is administered. The usual result is cessation of fever for ten to twenty days, and although parasites persist in scanty numbers the interval allows of recuperation or probably of some development of resistance, since the fever, on reappearance, is usually tertian in rhythm and less severe in character. (*c*) The terminal stage is characterized by a tertian replacing a quotidian rhythm, the individual attacks becoming milder, and sometimes failing to recur. The antimalarial treatment has been (1) 10 gr. three times a day for five days, or (2) 5 gr. three times a day for ten days, the quinine being given in solution by mouth. Plasmochin, harmine, harmaline and toxotropin all proved less effective than quinine. About 50 per cent. of cases relapsed, but were readily cured by 5 gr. of quinine three times a day for two or three days.

"From the limited number of results collected at Horton, it appears that the percentage of 'cures' of general paralysis in cases inoculated by mosquito-bites is considerably higher than the percentage in cases infected by direct blood inoculation." C. L.

FREEMAN (Walter). **Malaria Treatment of General Paralysis: Histopathologic Observations in Fifteen Cases.**—*Jl. Amer. Med. Assoc.* 1927. Apr. 2. Vol. 88. No. 14. pp. 1064–1068. With 8 text figs. [3 refs.]

In fifteen cases of death in general paralytics, the brains were examined. Eight died within a few weeks of the first chill. In them

the usual general paralytic process seemed exaggerated, the blood vessels being surrounded densely by infiltrating cells. This exudate becomes organized, with progressive reduction and then disappearance of the cells, the neuroglia reverting to its normal protoplasmic type. The cortex resumes nearly normal lamination and thickness. It is accordingly suggested that the term "remission" will in time be replaced by "recovery" of mental health. Of the seven other patients, one seemed naturally resistant—did not react adequately; another, after 14 rigors, showed no clinical or serological improvement and died 3 years later. In neither was there any arrest in the general paralytic process. This was, however, arrested in one dying four months after malaria. The other four, living 10, 17, 18 and 19 months after malaria, showed complete disappearance of inflammatory and degenerative lesions and considerable cortical repair.

C. L.

WÜRZ (P.). Ueber die Fieberbehandlung der progressiven Paralyse. [**Malarial Treatment of General Paralysis.**]—*Schweiz. Med. Woch.* 1927. Mar. 5. Vol. 57. No. 10. pp. 217–218. [4 refs.]

The strain of tertian malaria used in Basle in 25 cases was a mild one, the temperature reaching indeed 42° C., but spontaneous clinical cure after three to ten attacks resulting in 50 per cent. of cases although parasites persisted. Quinine was always given and, in the single case held to be resistant, arsenic as well. In two cases severe attacks ensued. Gametes existed. Infection was by injection. In six cases a second infection was attempted after four or more months. All failed even with provocative measures; and when for the nervous condition more febrile attacks were required, the effect was produced by African relapsing fever.

C. L.

CLAUDE (Henri), TARGOWLA (René) & CÉNAC (Michel). Le traitement de la paralysie générale par le paludisme expérimental. [**Treatment of G.P. by Malaria.**]—*Ann. de Méd.* 1927. Mar. Vol. 21. No. 3. pp. 169–200. With 13 text figs. [19 refs.]

Malarial infection was by hypodermic injection of three to five cc. of blood, the original strain being one which had done good service in Vienna, Brussels and Holland. Three of the 143 persons were refractory to infection. Quinine in doses of 1 to 1·5 gm. for some days stopped infection, only two or three cases relapsing. It was reinforced by arsenic. A second infection was as readily produced as had been the first. Rupture of the spleen did not occur.

C. L.

RUDOLF (G. de M.) & MARSH (R. G. B.). **Some Observations upon Carbohydrate Metabolism in Malaria. With Special Reference to the Effect of Insulin and Glucose upon Benign Tertian Malaria.**—*Jl. Trop. Med. & Hyg.* 1927. Mar. 1. Vol. 30. No. 5. pp. 57–63. With 13 charts in text. [12 refs.]

These observations were carried out on paralytics or dementia praecox cases under treatment with artificially inoculated malaria. When the blood was examined once, 15·4 per cent. disclosed glucose to

Benedict's test, whereas in 112 consecutive paralytics the percentage was 0·9. If, however, repeated examinations be made, sugar is almost constantly found after malaria. For example 8 of 9 showed sugar at one time or another, the number of examinations varying from 8 to 67 and the period after cessation of malaria from 1 to 122 days. The negative case was examined more than two hours after food eleven times between the thirty-fourth and 48 days. During malaria therapy the blood-sugar, estimated by Maclean's method, varied roughly speaking inversely with the temperature. The administration of glucose during the malarial paroxysm produced no obvious objective change or effect upon the parasites, but apparently brought subjective relief. Insulin administered during malarial therapy could not definitely be said to affect the numbers of parasites, but in 60 per cent. of instances the fever terminated, not apparently as the result of the lowering of blood sugar, and when relapse occurred it was mild with low pyrexia, suggesting a partial immunization. It is held inadvisable to give insulin if the temperature is likely to rise shortly after.

C. L.

St. John (J. H.). **Observations on the Use of** *Plasmodium vivax* **in the Treatment of Cerebrospinal Syphilis.**—*Amer. Jl. Syph.* 1927. Jan. Vol. 11. No. 1. pp. 14–22. With 3 charts in text. [1 ref.]

Twenty malarial infections are noted. Eighteen patients were injected subcutaneously, all successfully although in one no febrile attack supervened, with incubation periods varying from 7 to 20 days, parasites being very few in the donor's blood in the man who went to 20 days without clinical symptoms; one was injected intravenously; and one by *A. punctipennis* collected as larvae in Washington. Injections consisted of 4 cc. of infected blood. Fever showed the usual types and variations. Clinical interpretation was relied upon in determining whether the paroxysms should be stopped before or after the usual ten. In treatment, 7 cases received 2 gm. of quinine daily for three days; one relapsed in an observation period of 5 to 12 months. In 2 cases 2 gm. in one day caused disappearance of parasites. One relapsed within two weeks. Neoarsphenamine (neosalvarsan) 0·45 gm. in a single injection caused microscopical cure over an observation period of six months. In all, 5 cases were treated with this drug with two relapses. Intravenous mercurochrome had no effect on the parasites. Gametocytes were not suppressed in six months in the strains used.

C. L.

St. John (J. H.). **The Early Appearance of Gametocytes in artificially induced Tertian Malaria.**—*Jl. Amer. Med. Assoc.* 1927. May 14. Vol. 88. No. 20. p. 1561. [1 ref.]

In six cases of directly inoculated malaria, gametocytes were observed 5, 2, 2, 2, 3 and 2 days after the onset of symptoms, in four cases in numbers sufficient to be infective to mosquitoes.

C. L.

BUNKER, Jr. (Henry A.) **Serial Hourly Leucocyte Counts in Tertian Malaria. As observed in Malaria-treated General Paralytics.**—*Amer. Jl. Med. Sciences.* 1926. Nov. Vol. 172. No. 5. pp. 681–690. [33 refs.]

The parenteral introduction of protein causes a leucopenia, not infrequently succeeded by a leucocytosis. Tertian malaria cases had leucocytic counts made at hourly intervals. In 30 of 33 instances, there was a leucopenia beginning about the time of the rigor, the leucocytes reaching a minimum during the latter part, or at the apex of, the fever curve. A leucocytosis then set in, the white corpuscles reaching their maximum about two to four hours after the minimum, that is near the summit of the temperature curve or, more usually, during its gradual descent. The phenomenon is accordingly associated by the writer with "natural" protein intravenous injection in relatively massive dosage.

C. L.

TOMMASO (Lucherini). Ulteriori osservazioni intorno e all'influenza esercitata dalla malarizzazione artificiale sul quadro ematologico e clinico delle leucemie. [**Malaria Inoculation in Leucaemia.**]—*Policlinico.* Sez. Med. 1927. Feb. 1. Vol. 34. No. 2. pp. 60–88. With 4 charts in text. [27 refs.]

Tommaso describes four cases of leucaemia injected with blood containing *P. vivax*, and also treated with X-rays and with arsenicals. The conclusion reached is that in acute or subacute leucaemia, in which condition X-rays are valueless, injection of malaria should be tried. In chronic cases the violent malarial reaction renders preferable the use of other lines of treatment such as X-rays.

C. L.

WENDLBERGER (Julius). Blutgruppen und Impfmalaria. [**Blood Groups and Inoculation Malaria.**]—*Wien. Klin. Woch.* 1927. Mar. 17. Vol. 40. No. 11. pp. 345–346.

The writer injected, intravenously by choice, tertian malaria. In the relatively few cases investigated he is disposed to believe that a cause of failure to produce infection may lie in the different blood groups involved. Thus Group IV. seems to be one from which infection is readily conveyed to groups II, III, or IV, whereas, with the other groups he is disposed to conclude that infection is easier to produce when the donor and recipient of both belong to Group II or Group III. He notes that the matter merits further consideration, and indeed it may possibly open up wider interconnexions than are here suggested.

C. L.

PILCZ (Alexander). Zur Frage der Blutgruppen und Impfmalaria. [**Blood Groups and Inoculation Malaria.**]—*Wien. Klin. Woch.* 1927. May 19. Vol 40. No. 20. pp. 653–654. [1 ref.]

WENDLBERGER's work was repeated. Malarial infections in persons of blood group III passed on infection by injection to persons in groups I and II, and to groups III and IV. Group II infected groups II and III, group II and IV, and again, group II and IV, although the infection died out in the man in group IV. These results do not appear to favour the suggestion that the blood groups of donor and recipient are effective in determining whether infection shall appear or not.

C. L.

McKenzie (A.). **An Examination of the Question of Quinine Prophylaxis.**—*Kenya Med. Jl.* 1927. Jan. Vol. 3. No. 10. pp. 274–281. [11 refs.]

In this valuable and thoughtful compilation McKenzie brings out the following points:—The prophylactic action of quinine is non-existent; that is to say, given "prophylactically" it cures or keeps in control such infection as occurs, but does not prevent it. Its action is curative. It is ineffective against sporozoits, and merozoits must be present in numbers if the drug is to act efficiently. That action is indirect, through some mechanism in the host. Primary attacks are readily cured if there have not been previous quininization, which, if long continued, probably exhausts the body's capacity for dealing with the parasite, perhaps by lessening its reaction to quinine. He believes that, with adequate medical attention and proper nutrition, the taking of prophylactic quinine diverts attention from true prophylaxis against the vector, and by its usually unsatisfactory administration might possibly cause much malarial cachexia. In the discussion, the experience was emphasized that a regular quinine taker might, and did, get malaria but that the attack was nearly always mild, although McKenzie, in reply, did not believe that the mildness of attack attributed to the taking of 5 grains of quinine daily was borne out by experiment.

C. L.

Murat (E.). Quininisation préventive des agents du réseau algérien des chemins de fer Paris-Lyon-Méditerranée pendant deux années consécutives. [**Preventive Quininization of the Staff of the P.L.M. in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Sept. Vol. 4. No. 3. pp. 474–481. With 1 text fig.

In 1923 the employees of the Algerian portion of the P.L.M. suffered from malaria to the extent of 23·9 per cent. After the institution of a regular issue of prophylactic quinine in tablets, 0·4 gm. of the hydrochloride to be taken daily from 1st May to 30th October, the incidence fell to 15·8 per cent. in 1924 and 7·8 per cent. in 1925. [It seems necessary, however, to issue a warning against accepting this improvement as necessarily the result of the quinine. At the same time, there were issued clear instructions as to the ill effects of stagnant water, the need of mosquito nets, and the wisdom of destruction of anopheles in houses, and a questionary as to the use which had been made of these instructions. Unless the employees neglected them with the knowledge that such disobedience was unlikely to remain unknown, there was more than one factor concerned in the reported diminution of malaria.]

C. L.

Fowler (C. E. P.). **Malaria in Palestine. A Summary of Anti-Malarial Work carried out with the 54th Division in the Mulebbis Area, April to June, 1918.**—*Jl. Roy. Army Med. Corps.* 1926. Apr. Vol. 46. No. 4. pp. 241–248.

Fowler gives an idea of the immense amount of river bank training and of jungle cutting which was entailed by the military decision that it was necessary to retain, in 1918, a position on the rivers Auja and Lejja, lying to the north of Jaffa. These river banks were rectified, as was the Abu Zeitun marsh, and wells and cisterns; and lectures, nets

and repellents were employed. The writer asks, Can the infection of two thousand men, in spite of all this, be looked upon as a failure or a success? His answer is that, unquestionably, had the work not been undertaken the force would have melted away, and the justification for his belief is the condition of the remnant of the Turkish army who were found in this region.

"Not only may the measures be looked upon as having been successful, but they stand as a triumph of preventive medicine, and as a lasting example of what can be done in the fight against the worst malarial conditions. The opportunity for such an experiment is never likely to occur again, as no civil community in its senses could ever entertain such a project or countenance such a vast expenditure of money and labour for no financial return."

C. L.

FRANCHINI (Giuseppe). Su di un Plasmodio pigmentato di una scimmia. [**A Pigmented Plasmodium from a Monkey.**]—*Arch. Ital. Med. Sci. Colon.* Tripoli. 1927. Apr. Vol. 8. No. 4. pp. 187–190. With 1 plate. [8 refs.]

The author examined the blood of a Macaque (*M. cynomolgus*) and found in every field one or more parasites. The young schizonts were pyriform or spherical, with relatively small nucleus, and at first unpigmented. They increased in size and fine granules of yellowish-brown pigment appeared, disposed peripherally. Schizogony produced 4–8 merozoites. Gametocytes were very scarce. Parasitized corpuscles were smaller than the normal and were often much deformed. Schüffner's dots were never seen; pigmented mononuclear leucocytes were present. The affected corpuscles varied in diameter between 4·5 and 6 microns, and the young trophozoites measured 2·5 microns. The author concludes that this Plasmodium differs from both *P. inui* and *P. cynomolgi*.

H. Harold Scott.

LOBO (Vilanova). Sobre a genese provavel da linfocitose encontrada nos sangues normais dos indigenas de Goa. [**Probable Origin of Lymphocytosis met with in Normal Blood of Goanese.**]—*Arquivos Indo-Portugueses de Med. e Historia Nat.* Nova-Goa. 1926. Vol. 3. pp. 1–47. French summary, pp. 47–48.

Besides anaemia there was found in these cases a leucopenia more pronounced in those with splenomegaly in whom malaria parasites were not found. Febrile cases showed a lymphocytosis, apyretic cases in a large percentage, and normal cases [or controls] in a third of those examined. "Monocytes" were increased in numbers and the Arneth count was variable.

C. L.

ALFARO (Gregorio Araoz). La malaria nell' infanzia. [**Malaria in Childhood**].—*Malariologia.* Naples. 1927. Apr. 15. Ser. 3. No. 1. pp. 1–5. [15 refs.]

This paper deals with the well established observations that malaria is essentially an infection of childhood, and that at this age it shows itself in quite unexpected clinical forms. Of the recommendations made one is not stereotyped. It is that the two antimalarial sanitaria for children which exist in the Republic of Argentina, situated in mountain country or in parts not affected by malaria, should be multiplied.

C. L.

BOLOGNESI (Giuseppe). Le jeûne, élément étiologique de récidive de l'infection malarique. [**Fasting in the Causation of Malarial Relapse.**]—*Lyon Chirurgical.* 1926. Sept.–Oct. Vol. 23. No. 5. pp. 563–565.

Referring to experiments by CASAGRANDI, in 1906, in which fasting was a factor in producing relapse in bird malaria, Bolognesi refers to a human case in which he believes that this element was concerned. A woman of 46 swallowed a denture while asleep. It was localized by X-rays in the thoracic portion of the œsophagus, and extracted after great difficulties. In fear of ulceration from lacerations she was kept fasting. On the eighth day the temperature ran up to 41° C. [105·8° F.] with oedema of the neck and upper part of the chest and death 24 hours later. [There was, then, clear evidence of sepsis. Malaria is assumed because she stated that eight years before she had been infected with malaria, but had never had an attack throughout that period. The blood was evidently not examined.]

C. L.

POLECK. Die unbegründete Besorgnis vor der Kriegsmalaria und vor ihren Folgen. [**Unfounded Anxiety about War Malaria and its Effects.**]—*Muench. Med. Woch.* 1927. May 13. Vol. 74. No. 19. pp 812–815. [5 refs.]

There is, apparently, in German lay circles considerable alarm regarding the harm and consequences of malaria, in view of the infections which were introduced into that country at the end of the war. The question of the malaria treatment of paralytics also comes up. Poleck is satisfied of the backing of medical men with colonial experience in combating this unnecessary anxiety.

BROHIER (Sam. L.). **Chronic Malaria and Mania.**—*Gold Coast Rep. Med. & San. Dept. for Period Apr. 1925–Mar. 1926.* Appendix C. pp. 55–58.

The writer describes five cases in which maniacal symptoms were associated with the finding, usually with great difficulty, of a crescent in the blood. Under quinine and detention they all greatly improved or returned to normal.

AMEGHINO (Arturo). Nota sobre las relaciones entre psicosis y paludismo en la República Argentina. [**Relations between Psychosis and Malaria in the Argentine.**]—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. Nos. 14, 15 & 16. pp. 387–392. [18 refs.]

Ameghino urges the need of an investigation into the psychical effects of malaria in children, turning attention to imperfect mental development in those of malarial parents and their predisposition to cerebral abnormalities determined by other causes; to predisposition to other nerve infections and psychopathics among children themselves infected with malaria; and to the question whether malaria can itself produce localized cerebral lesions in infants.

MAJER (Josef). Die Malaria im Säuglings- und Kleinkindesalter. [**Malaria in Babies and Young Children**].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Mar. Vol. 31. No. 3. pp. 133–138. With 2 charts in text. [1 ref.]

Tiberias forms no exception to the well-recognized difficulty of making a certain clinical diagnosis of malaria in children.

DI PACE (Ignazio). Un altro caso di orchite di origine malarica. [**Another Case of Malarial Orchitis.**] *Malariologia.* Naples. 1927. Apr. 15. Ser. 3. No. 1. pp. 5–12. [5 refs.]

There is no mention of blood examination.

BOREL (M.). Résultats d'une enquête malariologique à Dalat (Cochinchine). **Malaria Findings at Dalat (Cochin China).**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 427-434.

Dalat is apparently being laid out as a local hill station for recreation and recuperation, and the land seems to slope down rapidly into malarious valleys, the plateau of Langbian itself being free. Local anopheles now reported for the first time are *A. fuliginosus*, *A. sinensis* and *A. maculatus*, but whether in the station or outside it does not seem clear.

NOCHELL (W.). [Beitrag zum Studium der Malaria in Mazedonien.] **Malaria in Macedonia.**]—*Glasnik Centralnog Higijenskog Zavoda*, Belgrad. 1926. Vol. 1. No. 1–4. pp. 95–119. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Feb. Vol. 31. No. 2. p. 93.]

In a Macedonian region the percentage of gametocyte carriers was the same throughout the year, parasites persisting in spite of season. Tertian malaria reached its maximum in July–August, subtertian in August–September and quartan in October–November. May, in the author's findings, is the best month for development of plasmodia in man and anopheles.

RONNEFELDT (F.). Zur Epidemiologie der Malaria in Rumänien. **Epidemiology of Malaria in Rumania.**]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1927. Feb. Vol. 31. No. 2. pp. 88–89.

Talmesch, a mountain village, 40 km. south of Hermannstadt in Rumania, is implicated as a centre of quartan malaria.

LOVEWELL (C. H.). **Malaria at Camp Stotsenburg.**—*Milit. Surgeon.* 1927. June. Vol. 60. No. 6. pp. 683–700. With 4 charts & 8 figs. on 2 plates. [1 ref.]

Application of the usual antimalarial measures, particularly clearing of streams, flushing, and the use of Paris green has been followed by a reduction of the malaria rate from 137 to 65 in two years.

C. L.

ALVAREZ (Washington). Paludismo y gestación.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. Nos. 14, 15 & 16. pp. 402–406.

ALVAREZ SOTO (Napoleon) & QUINTANA (Hector). El mercurocromo 220 en su acción sobre el paludismo.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. Nos. 14, 15 & 16, pp. 378–386. With 8 charts.

BINI (Guido). La lotta antimalarica a Fiumicino.—*Policlinico.* Sez. Prat. 1926. Oct. 18. Vol. 33. No. 42. p. 1464.

CARDAMATIS (Jean P.). Le traitement de la fièvre paludéenne.—*Grèce Méd.* 1926. Nov.–Dec. Vol. 28. No. 11–12. pp. 41–46. [14 refs.]

CHARRIER (H.) & REMLINGER (P.). Contribution à l'étude de la protection de Tanger contre le paludisme.—*Bull. Soc. Path. Exot.* 1927. Jan. 12. Vol. 20. No. 1. pp. 45–51. With 1 map in text.

HOSOMI (Shinji) & YOSHINO (Masutaka). On the Malaria Treatment against General Paralysis paying Special Attention toward Malaria Plasmodiae.—*Sei-I-Kwai-Med. Jl.* 1927. Feb. Vol. 46. No. 2. English summary pp. 10–12. [In Japanese.]

JAMES (S. P.). Sur le traitement de la paralysie générale par l'inoculation du paludisme.—*Bull. Office Internt. d'Hyg. Publique,* 1926. Dec. Vol. 18. No. 12. pp. 1397–1398. [1 ref.]

JANDULA (Ricardo). Nefritis subaguda en un paludismo tipo terciano. Tratamiento. Evolución.—*Bol. Inst. Clin. Quirúg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 393–401. With 2 charts.

JOFFE (H.). [About Malaria Therapeutics.]—*Harefuah.* Jerusalem. 1927. Apr. Vol. 2. No. 2. p. 390–393. [In Hebrew.]

KRISHNAMURTY (Ch.). Pernicious Forms of Malaria at Sompeta, Ganjam District.—*Indian Med. Gaz.* 1927. Mar. Vol. 62. No. 3. pp. 144–145.

LUPU (N. Gh.) & MISSIRLIU (Vl.). Un cas de paludisme chronique avec polynucléose.—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1927. Feb. Vol. 9. No. 2. pp. 19–23.

MARTINI (E.). Zur Frage der therapeutischen Malaria.—*Muench. Med. Woch.* 1927. June 10. Vol. 74. No. 23. pp. 980–981.

MOSTO (Domingo) & BRACHETTO BRIAN (Domingo). Sobre la anatomia patológica del paludismo.—*Semana Méd.* 1927. May 5. Vol. 34. No. 18 (1738). pp. 1105–1108. [2 refs.]

NAUCK (Ernst G.). Altchinesische Medizin und Malaria.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. May. Vol. 31. No. 5. pp. 197–201.

NEGRO (Francesco). Influenza della malaria sullo sviluppo fisico.—*Riforma Med.* 1927. May 23. Vol. 43. No. 21. pp. 491–492.

DE PEÑALVA TORINO (Tomàs D.). Distribución geográfica de la caries dentaria en el norte argentino y probable influencia del paludismo en su etiología. —*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 416–421.

PERONI (Giacomo). Sur le traitement du paludisme par la *Smalarina Cremonese* (A propos de la communication de M. E. W. SULDEY).—*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 304–305.

QUINTANA (Héctor) & ALVAREZ SOTO (Napoleón). La berberina en el tratamiento del paludismo.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 360–362.

SCHAPIRO (L.). [The Resistance of Erythrocites to Solutions of NaCI and its Diagnostic Importance in Typhoid Fever and Malaria.]—*Harefuah.* Jerusalem. 1927. Apr. Vol. 2. No. 2. pp. 375–382. [In Hebrew.]

SOLA (Eduardo). Gastrorragia abundante en palúdica grávida a termino.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 488–491.

WALDORP (C. P.). Endocrinopatías en los palúdicos.—*Bol. Inst. Clin. Quirúrg.* Buenos Aires. 1926. Vol. 2. No. 14, 15 & 16. pp. 407–415. [15 refs.]

YOSHINO (Masutaka). On the Possibility of Inoculation of *Plasmodium malariae* of Human Origin in Animal Tests.—*Sei-I-Kwai-Med. Jl.* 1926. Nov. Vol. 45. No. 5. English Summary, pp. 11–12. [In Japanese.]

RABIES: A REVIEW OF RECENT ARTICLES. VII*

i. *Geographical Distribution.*

The Pretoria correspondent of the *British Medical Journal* (June 11th, 1927), draws attention to the general question of the existence of rabies in the Union of South Africa. Since 1916, six cases exhibiting the symptoms of rabies have been reported, but unfortunately in no case has a definite pathological diagnosis been made. Every case ended fatally. The infecting animal appears in most instances to have been the yellow mongoose (*Cynictus pencillata*), and in one case the wild cat or genet was to blame.

KRIGE[1] describes a further group of cases from Standerton. A boy died apparently of rabies after having been bitten both by a dog and by a "rooi merkat." At a neighbouring village two further cases were reported to have occurred. These were bitten by a puppy which had also bitten several pigs and two natives. One of these bitten persons died, and both pigs "went mad." This outbreak is being investigated by the Health Department, and a full report will be published.

CIOTOLA and ALONGI[2] discuss a recent epidemic of rabies in Eritrea. The virus like that of West Africa exists as a rule in a much attenuated state. In certain circumstances virulence becomes enhanced, in which case the virus does not differ in any respect from that met with in European countries.

ii. *The Virus.*

LEVADITI, NICOLAU and SCHOEN[3] present their case in favour of the protozoal nature of the rabies virus. The article is fully illustrated. They believe that fixed virus is a mutative variety of the *Glygea lyssae* with strictly neurotropic affinities, which are related to the animal in which mutation has occurred. The characteristic feature of fixed virus is that it has definitely lost the pansporoblastic phase of the intracellular evolutionary cycle. Some strains of street virus are more easily transformed than others; some are totally refractory. A number of strains have been examined. The general characters of these strains form the subject matter of a note by REMLINGER[4]. RAVINA[5] furnishes a general summary of the work of LEVADITI and his collaborators. PAUL and SCHWEINBURG[6] contribute a very comprehensive article on morphological characters, and review a large number of staining methods. They uphold the parasitic nature of the Negri body, but point out, that whilst in protozoa one finds a chromatin nucleus in basophil protoplasm, the "innenkörper" of the Negri body are always basophil, and have not the characters of nuclei. They do not accept the view

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* For the sixth of this series see this Volume, pp. 222–231.

1 KRIGE (C. F.). A Case of Hydrophobia (?).—*Jl. Med. Assoc. S. Africa.* 1927. Apr. 9. Vol. 1. No. 7. pp. 173–174.

2 CIOTOLA (Alberto) & ALONGI (Giuseppe). Sull' epizoozia di rabbia sviluppatasi nella colonia Eritrea nel biennio 1925–1926.—*Arch. Ital. Sci. Med. Colon.* 1927. Feb. Vol. 8. No. 2. pp. 63–76. With 1 text fig. [10 refs.]

3 LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). Recherches sur la rage.—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 973–1069. With 14 text figs., 19 curves & 1 plate (coloured). [Numerous refs.]

4 REMLINGER (P.). Note sur les virus de rue envoyés de Tanger à M. Levaditi.—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 1070–1074.

5 RAVINA (A.). Recherches récentes sur la nature du virus rabique.—*Presse Méd.* 1927. Mar. 12. Vol. 35. No. 21. pp. 324–326. [9 refs.]

6 PAUL (Fritz) & SCHWEINBURG (Fritz). Zur Morphologie des Lyssaerregers.—*Virchows Arch. f. Path. Anat. u. Physiol.* 1926. Oct. 28. Vol. 262. No. 1. pp. 164–210. With 11 text figs. (5 coloured.) [85 refs.]

that the Negri body is a degeneration product, and are also not satisfied with the Chlamydozoon theory. They believe that the small bodies originally described by J. KOCH are the precursors of the Negri body. The whole question was discussed at the International Rabies Conference, whose resolutions have already been brought to notice (*ante*, p. 483).

Pereira DA SILVA[7] having found Negri bodies in the medulla, but not in the hippocampus of a human case of rabies, conceived the idea that a similar state of affairs might be found in cases of fixed virus rabies in which the incubation period was unduly prolonged. A rabbit was inoculated with a mixture of serum and fixed virus, and developed symptoms in 26 days. No Negri bodies were observed in the hippocampus, but small bodies, some punctiform and some with less well defined margins, were found in the medulla. Their staining reactions were those of Negri bodies, and in appearance they were similar in all respects to the small bodies found in the medullas of rabbits inoculated with street virus. Following LEVADITI and his collaborators who found that in the mutation from street virus to fixed virus, the disappearance of the more complex Negri bodies occurred first in the hippocampus, DA SILVA considers that it is logical to expect that in an inverse mutation the earliest visible forms would be small punctiform bodies, and that their first appearance would not be in the hippocampus. LEVADITI and his co-workers from their experiments have concluded that the mutation from street to fixed virus is irreversible; DA SILVA suggests that a reversion may be possible if the incubation period be prolonged by artificial means, as for example by using serum-virus mixtures.

Further facts relating to the characteristics of various strains of fixed virus are reported. It will be remembered that the Tangiers strain shows considerable modification, that the Rome virus has suffered a loss of virulence with regard to its infectivity on intracorneal inoculation, that the Algiers virus has lost virulence with regard to desiccation and to the action of glycerine, but remains unaltered as regards intracorneal inoculation. MARIE[8] reports that the Paris strain is just as virulent as it was in the time of PASTEUR, as tested by guineapig inoculation. The virulence is, however, not correlated to the age of the medulla. Thus a one day dried cord gives an incubation of nine days, and a six day dried cord infects with the same incubation period.

ROCHAIX[9] has found no evidence of attenuation of the Lyons virus which is in its 1,216th passage, and agrees with MARIE that there is no correlation between the number of days of drying and the length of the incubation period.

REMLINGER and BAILLY[10] from further experiments in Tangiers find that whilst the street virus of that locality shows a mortality of 100 per cent. on intracorneal inoculation, the Tangiers strain of fixed virus (2,360th passage) infects by a similar route in only 14 per cent. of cases. They believe that a marked mutation has taken place, and raise the question as to whether a younger strain might not be more potent as an immunizing agent.

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7 DA SILVA (E. Pereira). Corps de Negri et virus fixe.—*C.R. Soc. Biol.* 1927. May 20. Vol. 96. No. 16. pp. 1342–1344. [4 refs.]

8 MARIE (A. C.). Pouvoir pathogène du virus rabique fixe.—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 45–48. [6 refs.]

9 ROCHAIX (A.) Sur la virulence des moelles utilisées pour les vaccinations pastoriennes contre la rage.—*C.R. Soc. Biol.* 1927. May 20. Vol. 96. No. 16. pp. 1318–1320. [3 refs.]

10 REMLINGER (P.) & BAILLY (J.). Sur l'atténuation du virus rabique fixe pour la chambre antérieure de l'oeil.—*C.R. Soc. Biol.* 1927. Apr. 1. Vol. 96. No. 12. pp. 824–826.

GIRARD and ROBIC[11] draw attention to the effect of temperature upon deterioration. Whilst glycerinated cords (1, 2 and 3 day dried) retain their virulence for 20 days at a temperature of 10° C., virulence is lost within 10 days at a temperature of 20° C.

BABLET, ADVIER and SOUCHARD[12] find that the virus of Cochin China resists desiccation for from 7 to 9 days, and the effects of dehydration by glycerine for from 30 to 34 days. The conservation of virus in glycerine is inversely and regularly proportional to the duration of the previous desiccation. Thus 2 day cords retain their potency in glycerine for 20 days, 3 or 4 day cords for 15 days, 5 or 6 for 10 days, and 7 or 8 day cords for 5 days.

BENNETT[13] has investigated street virus from cases which occurred in the Anglo-Egyptian Sudan. The disease was introduced into this district in 1926 apparently from Central Africa. It caused furious rabies in animals, and some human beings were infected. From various experiments the author concludes that there is no special African virus.

COWDRY[14] describes experiments carried out with a virus sent to the Rockefeller Institute from Japan by Dr. KOBAYASHI. An outbreak of encephalitis had occurred, which had a case mortality of 50 per cent., and had caused in all 4,000 deaths. After many failures a strain of virus was transmitted to the rabbit. This strain in the hands of COWDRY gave rise to inclusion bodies similar to those of rabies. Cross immunization experiments with the rabies virus showed that either virus protected against the other. From the symptomatic picture, the pathological findings and the cross immunization experiments, the writer concludes that Kobayashi virus was indistinguishable from ordinary rabies virus.

iii. *Symptoms and Diagnosis.*

REMLINGER[15] enquires into the existence of consumptive rabies. In dogs, bitten or inoculated, emaciation and death ten to twelve days after the onset of symptoms may occur in exceptional cases. In laboratory animals, with the exception of monkeys and birds, the same termination is seen after inoculation with fixed and street viruses, but only very rarely. Whilst not denying the possible existence of a true consumptive form, REMLINGER draws attention to its extreme rarity. He considers that the only proof would be the exaltation of virulence on continued subpassage. (For experiments of this nature see LAMB and MCKENDRICK, 1909, Sc. Mem., Govt. of India. No. 36.)

IONNESCO[16] describes three cases of "râge imaginaire," and discusses the relative diagnosis.

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11 GIRARD (G.) & ROBIC (J.). Influence de la température à laquelle sont conservées les moelles rabiques glycérinées sur la durée de leur virulence. —*C.R. Soc. Biol.* 1927. Apr. 26. Vol. 96. No. 13. pp. 952–953.

12 BABLET, ADVIER & SOUCHARD. Recherches expérimentales sur le virus rabique des rues en Cochinchine.—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 199–200. [1 ref.]

13 BENNETT (S. C. J.). A Note on the Nature of the Rabies Virus in the Anglo-Egyptian Sudan.— *Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 123–126.

14 COWDRY (E. V.). Comparison of a Virus obtained by Kobayashi from Cases of Epidemic Encephalitis with the Virus of Rabies.— *Jl. Experim. Med.* 1927. May 1. Vol. 45. No. 5. pp. 799–806. [4 refs.]

15 REMLINGER (P.). Existe-t-il une rage consomptive ?—*C.R. Soc. Biol.* 1927. Feb. 25. Vol. 96. No. 7. pp. 456–458. [4 refs.]

16 IONNESCO (Demetre). Les troubles psychiques à la suite du traitement antirabique et le diagnostic differentiel de la rage.—*Bull. et Mém. Soc. Méd. Hôpit. de Bucarest.* 1927. Jan. Vol. 9. No. 1. pp. 13–18.

DAVIES[17] describes a case of hydrophobia in which doses of 1/150 gr. of atropine sulphate, every five hours, controlled the laryngeal spasm over a period of four and a half days. The patient ultimately died of heart failure.

LINDEMAN[18] describes three cases diagnosed as nervous distemper in dogs. The brains of two of these contained Negri bodies; the first was killed on the eighth day of sickness, and the second died 22 days after developing symptoms.

LOEWENTHAL[19] examined a cat's brain in which, whilst no Negri bodies were present in the horn of Ammon, inclusion bodies—with vacuolization, but no "innen körper"—were found in a neighbouring area. Two rabbits were inoculated from the brain of the cat; both remained free from symptoms (12 weeks). He refers to LUZZANI and JASTREMBSKY's statement that inclusions may be found in the brains of normal cats.

iv. *Pathology.*

Three papers relate to the changes in the differential leucocytic count occurring during the course of the disease in inoculated animals. ESQUIVEL and LASTA[20] examined eighteen animals and found an increase above the normal of 80 per cent. in the polymorphonuclear leucocytes, and a decrease of 60 per cent. in the lymphocytes. The variations in the large mononuclears were inconstant. Eosinophils and basophils were also decreased. In two control animals inoculated with normal brain substance no variation was observed. CREMONA and SERRAVALLE[21] examined the blood of animals treated with Finzi's mixed hetero-homologous vaccine, and found similar variations. OHASHI[22] traced the course of the variations from day to day and found that the polymorphonuclear leucocytes after a preliminary decrease, commenced to increase with the onset of symptoms, and attained just before death to twice the normal proportion. The lymphocytes increased initially, and finally fell to one seventh normal. The large mononuclears increased to twice normal. Control animals treated with normal brain showed no change. All these writers believe the change to be of a specific nature.

LÖWENBERG[23] has examined the cerebro-spinal fluid of four cases of human rabies with respect to their cell count and their colloid

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17 DAVIES (G. R.). A Case of Human Hydrophobia at Moyale.—*Kenya Med. Jl.* 1927. Jan. Vol. 3. No. 10. pp. 292–294.

18 LINDEMAN (S. J. L.). Difficulties in the Differential Diagnosis between Rabies and Nervous Forms of Distemper.—*Jl. Roy. Army Med. Corps.* 1927. Apr. Vol. 48. No. 4. pp. 303–306.

19 LOEWENTHAL (Waldemar). Eine Fehldiagnose auf Wut?—*Cent. f. Bakt.* I. Abt. Orig. 1927. Feb. 5. Vol. 101. No. 6–7. pp. 393–396. With 1 text fig. & 4 figs. on 1 coloured plate.

20 ESQUIVEL (Ricardo) & LASTA (Clemente G.). La formula leucocitaria en la rabia.—*Semana Méd.* 1927. Mar. 31. Vol. 34. No. 13. (1733). pp. 804–815. With 18 charts.

21 CREMONA (P.) & SERRAVALLE (G.). Formule leucocytaire au cours de la vaccination antirabique chez les chiens traités avec le vaccin mixte hétérohomologue de Finzi.—*Rev. Path. Comp. et Hyg. Générale.* 1926. Dec. 20. Vol. 26. No. 315. pp. 980–986. With 2 charts in text.

22 OHASHI (Mmsanosuke). On the Changes in the Blood and the Distribution of the Virus in Rabid Animals.—*Ann. Rep. Vet. Laboratory, Nishigahara, Tokyo, Japan, for Year 1925.* Appendix pp. 73–80. [6 refs.]

23 LÖWENBERG (Konstantin). Der Liquor cerebrospinalis bei menschlicher Lyssa.—*Muench. Med. Woch.* 1926. Dec. 24. Vol. 73. No. 52. pp. 2203–2204.

reactions. His results are somewhat irregular, but he believes that acute cases with meningitis and a high phagocytosis may occur without exhibiting the usual colloid reactions characteristic of meningitis.

MARIE[24] extends previous observations on the presence of cholesterin in the blood and tissues of rabbits which had received an intracerebral dose of fixed virus. He had found a three or four-fold rise in the blood serum using the method of Grigaut. He has investigated the content of the bulbo-protuberantial portion of the suprarenals, and finds variations rising to 30 per thousand. A corresponding decrease takes place in the brain.

REMLINGER and BAILLY[25] examine the statement of QUAST that fixed virus is present at the end of treatment in the brains of dogs which have received treatment by the Högyes Phillips method. Using Calmette's method of treatment on 15 animals (5 cats, 5 rabbits and 5 guineapigs) he failed to demonstrate the presence of fixed virus by animal inoculation, up to the 10th day after treatment. Negative results also followed from 3 dogs tested 0, 5 and 18 days after completion of this treatment, and also in the case of 5 dogs treated by the Phillips-Boecker method. The writers conclude that the demonstration of fixed virus in the brain of a treated animal is a true indication that an animal has died of fixed virus rabies.

Rabicidal properties have been demonstrated by KONDO[26] in the sera of rabbits which have received intravenous injections of fixed virus over a period of 42 days. The sera were examined on the 21st day after completion of treatment. Although no agglutinins, precipitins or complement fixing substances could be demonstrated, KONDO found that the serum was slightly rabicidal. The serum of naturally immune or refractory animals possessed the same property, whilst that of normal rabbits and of those treated with normal brain substance were practically inactive. This property vanished when the serum was heated to 80° C. for 30 minutes, but was unaffected by heating at 70° C. for the same period. The best results were obtained by keeping the virus serum mixture at 37° C. for 2 hours before administration.

SPERANSKY[27] (Leningrad) contributes an interesting article in which an unusual type of experimentation is developed. He believes that the symptoms of rabies are characteristic of lesions in the subcortical parts of the brain, in those centres which have to do with combined automatic movements. They are not specific, and appear to be similar to those which follow other toxic processes such as tetanus, strychnine poisoning, and even toxic encephalitis. A tendency to biting is a recognised characteristic of decerebrated dogs and cats. By injecting 3 cc. of antirabic serum under the dura mater the author succeeded in prolonging the incubation period. Again by repeated withdrawings of the cerebro-spinal fluid by suboccipital puncture of the sac of the dura mater, the incubation period was prolonged. He claims that simple

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24 MARIE (A. C.). Variations de la cholestérine au cours de l'infection rabique.—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 195–198. With 1 chart in text. [2 refs.]

25 REMLINGER (P.) & BAILLY (J.). Le virus fixe passe-t-il dans le système nerveux central au cours du traitement antirabique ?—*C.R. Soc. Biol.* 1927. Mar. 18. Vol. 96. No. 10. pp. 683–684. [1 ref.]

26 KONDO (Shoichi). On the Rabicidal Property of Anti-Rabies Serum.—*Ann. Rep. Vet. Laboratory, Nishigahara, Tokyo, Japan, for Year 1925.* Appendix. pp. 47–59. [11 refs.]

27 SPERANSKY (A.). Faits nouveaux sur la pathogénie et la prophylaxie de la rage.—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 166–188. With 5 text figs. [4 refs.]

contact of virus with the surface of the brain is insufficient to give rise to infection and that propagation by means of the cerebrospinal fluid is necessary for the development of the disease process. In the case of three dogs a part of the subdural space was isolated by previous operation. Sometime afterwards five lethal doses of fixed virus were introduced into the isolated "ventricle." In two of the dogs there was a 3 to 4 days prolongation of the incubation period; the third survived. He concludes that the free flow of the cerebro-spinal fluid is necessary for the penetration of the virus into the subcortical areas. The author has commenced experiments on active immunization by the introduction of vaccine into the subdural space. The results so far are inconclusive.

v. *Methods of Treatment.*

It is interesting to note that all except two of the communications which relate to this section are concerned with treatment by means of dead vaccines. The disinfectant material may be phenol, formalin, or ether, and the process of killing may be carried out at room temperature, blood heat, or at 60° C. It does not seem to be material which method is employed. The general conclusion arrived at is that, as in the case of bacterial vaccines, risk is excluded, and a solid immunity can be obtained by the use of dead material. This conclusion was also arrived at after full discussion at the International Rabies Conference. It was also resolved that comparative tests be carried out with vaccines killed by various methods. The main point is that dead vaccines are safer than living, and that in suitable dosage they induce a solid immunity. Thus SCHMIDT-WEYLAND[28] established immunity in mice both by the use of fixed virus brain heated at 60° C. for 2 hours, and by 1 per cent. carbolized virus. As the result of a number of experiments, he was unable to obtain a degree of immunity with fresh vaccine, in doses approximating to the lethal dose, higher than that obtained by dead vaccines, nor did he find that 1 and 2 day cords gave a higher immunity than 3 day cords. HERRMANN[29] using his "58-60" Vaccine (in 0·5 per cent. phenol, heated at 58 to 60° C. for half an hour), claims that he obtained as good results as by the use of fully virulent emulsions. And V. PUNTONI[30], who uses an attenuated, but not killed, carbolized virus in Rome, and a dead vaccine in his outlying dispensaries, experienced a total mortality of 0·16 per cent. in each group. HERRMANN[31] in a second paper examined glycerinated cords and found that they did not maintain a definite strength.

MARIE and MUTERMILCH[32] achieved a considerable degree of immunity in rabbits which had on three occasions received 0·5 cc. of a 1/20

28 SCHMIDT-WEYLAND (Paul). Immunisierungsversuche gegen Lyssa an Mäusen.—*Ztschr. f. Hyg. u. Infektionskr.* 1927. Apr. 29. Vol. 107. No. 2. pp. 436–440. [1 ref.]

29 HERRMANN (Otto). Vergleich der Immunisationsfähigkeit der virulenten antirabischen ex tempore hergestellten Emulsion, der abgetöteten konservierten Vakzine "58–60" und der normalen Nervensubstanz.—*Cent. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6-7. pp. 390–397.

30 PUNTONI (V.). La vaccinazione antirabica con i vaccini fenicati. Sei anni di applicazione nell' Instituto Antirabico di Roma.—*Ann. d'Igiene.* 1926. Nov. Vol. 36. No. 11. pp. 765–786. [13 refs.]

31 HERRMANN (Otto). Ueber die Veränderung der Virulenz des in Glyzerin konservierten Virus fixe.—*Cent. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6-7. pp. 406–412. [3 refs.]

32 MARIE (A. C.) & MUTERMILCH (S.). Essais de vaccination antirabique du lapin par la voie méningée.—*C.R. Acad. Sci.* 1927. Apr. 4. Vol. 184. No. 14. pp. 911–913. [3 refs.]

emulsion of brain etherized for 5 to 6 days at room temperature. They conclude that the intrarachidian path of inoculation is effective against the severest test even when the dosage is small (1·5 cc. ether virus).

PLANTUREUX[33] suggests vaccines emulsified in oil, in dextrin (33 per cent.), in phenol serum, and in 4 per thousand formalin. He gives preference to the last.

COSTA, BOYER and PLACIDI,[34] using formolysed vaccines, were in some instances able to protect against intraocular injection, but never against intracranial.

NICHOLLS and BURGESS[35] describe the preparation and use of the carbolized vaccine in use in Ceylon.

REMLINGER and BAILLY[36] point out that paralytic accidents are not so rare in dogs as they are in man. Amongst five dogs treated with glycerinated cords he observed one case of paralytic accident, and amongst a second group of five treated by the Phillips method a further case occurred. Both were cases of *râge laboratoire.*

These authors[37] also turn to the possibility of the immunity against rabies being local in the Besredka sense. They immunized eighteen guineapigs by eight cutaneous applications (with friction) of etherized cords. Eight of these received a test dose of fixed virus rubbed on the skin ; all survived (as compared with eight controls, two of which survived). The remaining ten were inoculated with street virus ; six survived (as compared with 10 controls of which all died). Two other experiments carried out with the same object gave indefinite results. They conclude, however, that there is some evidence in favour of a local immunity.

vi. *Statistics.*

OUCHAKOW[38] presents statistics from Leningrad, where 2 and 3 day dried cords are used. Amongst 2,018 persons treated five died or a total mortality of 0·24, and a reduced mortality of 0·14.

ROCHAIX[39] reports no deaths amongst 327 persons treated at Lyons and VIALA[40] no deaths amongst 634 at Paris. At Tunis[41] three deaths

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33 PLANTUREUX (E.). Recherches sur la rage. Nouvelles méthodes de traitement antirabique.—*Arch. Inst. Pasteur d'Algérie.* 1926. Dec. Vol. 4. No. 4. pp. 528–572. [56 refs.]

34 COSTA (S.), BOYER & PLACIDI (L.). Essai de vaccination antirabique par un vaccin formolé.—*C.R. Soc. Biol.* 1927. Feb. 4. Vol. 96. No. 4. pp. 293–294. [6 refs.]

35 NICHOLLS (Lucius) & BURGESS (Edwin). The Preparation of an Anti-Rabies Vaccine.—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1927. Mar. 16. Vol. 2. Pt. 1. pp. 13–19. With 3 text figs.

36 REMLINGER (P.) & BAILLY (J.). Paralysies au cours du traitement antirabique chez le chien. Application possible à l'étude des accidents paralytiques de l'homme.—*C.R. Soc. Biol.* 1927. Mar. 25. Vol. 96. No. 11. pp. 772–773.

37 REMLINGER (P.) & BAILLY (J.). Contribution à l'étude de la vaccination locale dans la rage.—*C.R. Soc. Biol.* 1927. Apr. 1. Vol. 96. No. 12. pp. 826–827.

38 OUCHAKOW (W. G.). Rapport annuel pour 1925 du service antirabique à l'institut de médecine expérimentale.—*Arch. Sci. Biol.* 1926. Vol. 26. No. 4–5. French summary p. 388. [In Russian, pp. 279–288. 5 refs.]

39 ROCHAIX (A.). Le traitement antirabique dans la région lyonnaise en 1925.—*Jl. Physiol. et Path. Gén.* 1927. Mar. Vol. 25. No. 1. pp. 73–75.

40 VIALA (Jules). Les vaccinations antirabiques à l'Institut Pasteur en 1926.—*Ann. Inst. Pasteur.* 1927. Apr. Vol. 41. No. 4. pp. 483–487.

41 ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS. 1927. Apr. Vol. 16. No. 1. pp. 99–117. Fonctionnement des services de l'Institut Pasteur pendant l'année 1926.

occurred amongst 789 persons treated, one of which was a failure. From Madrid, RAMÓN Y FAÑANÁS[42] reports one death amongst 1,377 treated by the Högyes method.

VAN GENDEREN[43] discusses the relative efficiencies of treatment by carbolized vaccines, and by Höyges method, and in particular examines the statistics of the Pasteur Institute at Kasauli (India). Her analysis emphasizes the recognized variability of the factors relating to the type of population treated at different institutes. The only satisfactory comparison of two methods of treatment appears to be the treatment of alternate cases at one and the same institute. VAN GENDEREN gives the results of a comparative test carried out in Java, in which 646 persons were treated by Högyes method and 444 persons by the Indian method. The method of alternate cases was evidently not employed. The results were in favour of Högyes method, but VAN GENDEREN realizes that the differences are not necessarily significant. It may be interesting in this connexion to point out that a comparative test of the efficacies of carbolized and ether vaccines is at present being carried out at Kasauli. Although over 900 cases have been treated with ether vaccine, the Director does not consider that this number is sufficient for definite conclusions to be drawn. It should also be remembered that at various periods the patients at Kasauli have been treated by dried cords, fresh dilutions, and carbolized vaccine, and the conclusion has been arrived at that the results following the administration of carbolized vaccine are at least as good as those following the two other methods of treatment- a conclusion towards which those who have conducted comparative tests on animals are steadily tending. The changes in treatment which have been made at Kasauli have been based upon animal experiment, as well as upon statistics, and have been influenced in no small measure by the absolute innocuousness of treatment by carbolized vaccines.

vii. *Canine Rabies.*

UMENO[44] publishes the following statistics relating to the preventive inoculation of dogs in Tokyo. The vaccine is that of Umeno and Doi.

	Non-inoculated registered dogs.			*Inoculated registered dogs.*		
Year.	*Number.*	*Rabies.*	*Mortality.*	*Number.*	*Rabies.*	*Mortality.*
1921 ...	3,886	179	4·61	22,181	6	0·02
1922 ...	1,188	92	7·74	24,282	19	0·08
1923 ...	6,780	42	0·68	19,959	7	0·03
1924 ...	2,279	166	7·23	24,150	43	0·18
1925 ...	7,835	50	6·38	27,579	30	0·11

Of the inoculated dogs 17 developed rabies within 2 weeks after inoculation (6 in 1921, 4 in 1922, and 7 in 1924—the figures for 1925 are not yet available).

42 RAMÓN Y FAÑANÁS (J.). Estadística de los casos tratados por el método antirrábico de Högyes en el Instituto Nacional de Higiene de Alfonso XIII durante los años 1924 y 1925.—*Arch. Inst. Nac Higiene de Alfonso XIII.* 1926. Oct. Vol. 4. No. 4. pp. 111–115.

43 VAN DEN HOVEN VAN GENDEREN (Jeanne). Resultaten der voorbehandeling van door dolle honden gebeten personen der Buitengewesten met door carbol gedood virus-fixe. Opmerkingen over de Britsch-Indische statistieken der antirabies-behandeling en over lyssa-statistieken in het algemeen.—*Geneesk. Tijdschr. v. Nederl.-Indië* 1926. Vol. 66. No. 6. pp. 760–786.

44 UMENO (Shinkichi). Preventive Inoculation of Dogs against Rabies.—*Far Eastern Assoc. Trop. Med. Trans. Sixth Biennial Congress, Tokyo, 1925.* Vol. 2.pp. 527–531.

SCHERN[45] gives results of post infectional immunization with single doses of fresh virus upon dogs which had been bitten by rabid dogs and which received their treatment less than 14 days after having been bitten. Out of 18 dogs so treated none developed rabies. The author states that other dogs bitten by the same rabid dogs developed the disease. He is of the opinion that in general 40 per cent. of the untreated die.

KONDO[46] examines the effect of temperature upon the Japanese vaccine. He obtained the most satisfactory results with vaccines which had been kept at 37° C. for 3 days. He states that the immunity in the dog after doses of 5 cc. lasts for about a year. He summarizes the Japanese experience as follows. During the years 1918 to 1925, of 755,072 treated dogs 170 have developed rabies; of 115 cattle, 5 have died of 69 horses, 2 have died; of 7 sheep, 4 have succumbed; and of 5 goats 2 have developed rabies. The remainder, including 2 swine, remained well for a year after treatment was afforded.

BAILLY[47] reports that four horses and two mules treated by Remlinger's etherized virus remained well – the horses after 9 months, and the mules after 5 months. Each animal received 8 grammes of nerve substance.

CRAWFORD[48] has treated three horses with carbolized virus (SEMPLE) in doses of 10 cc. of a 5 per cent. emulsion. Of these two died of rabies, whereas of two horses which had not received treatment both died.

BAILLY[49] used Remlinger's ether vaccine preventively upon 39 dogs giving three doses, each consisting of a fixed virus brain, the first after 25 hours immersion in ether, the second after 20 hours immersion, and the third after 15 hours immersion. Each dose was emulsified in 40 cc. of physiological saline. No accidents, paralytic sequelae or wasting were observed, in spite of the high doses employed. A solid immunity was developed in all the treated animals, whilst on the other hand 7 out of 11 controls developed the disease.

MIESSNER and BAARS[50], after a statistical survey of canine rabies in Germany, contrast and extend previous observations on the immunizing properties of fresh virus, Umeno and Doi's vaccine, and Lyssin (this *Bulletin*, Vol. 23, p. 698) and find that Lyssin is as potent as fresh virus. In a further paper BAARS[51] gives a résumé of this work.

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45 SCHERN (Kurt). Postinfektionelle Immunisierungsversuche sowie Immunisierungsversuche in Verdachtsfällen gegen Tollwut unter den Bedingungen der Praxis.—*Berlin. Tierärzt. Woch.* 1927. May 6. Vol. 43. No. 18. pp. 298–300. [1 ref.]

46 KONDO (Shoichi). On the Anti-Rabic Vaccination in the Dog.—*Ann. Rep. Vet. Laboratory, Nishigahara, Tokyo, Japan, for Year 1925.* Appendix pp. 1–4.

47 BAILLY (J.). Pratique de la vaccination antirabique des solipèdes par le virus-éther (méthode de Remlinger).—*Rev. Gén de Méd. Vét.* 1927. May 15. Vol. 36. No. 425. pp. 254–258. [5 refs.]

48 CRAWFORD (M.). Four Cases of Equine Rabies with Failure to protect with Anti-Rabic Vaccine.—*Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 140–144. [1 ref.]

49 BAILLY (J.). Vaccination antirabique du chien par la méthode de Remlinger. —*C.R. Soc. Biol.* 1926. Dec. 3. Vol. 95. No. 35. pp. 1317–1318. [1 ref.]

50 MIESSNER (H.) & BAARS (G.). Immunisierung gegen Lyssa der Hunde mit Lyssin.—*Cent. f. Bakt.* 1. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1/3. pp. 79–108. [Numerous refs.]

51 BAARS (G.). Immunisierung der Hunde gegen Tollwut.—*Deut. Tierärzt. Woch.* 1927. Feb. 12. Vol. 35. No. 7. pp. 99–102. [1 ref.]

SCHNÜRER and DAVID[52] have conducted a number of experiments on the percutaneous treatment of dogs. Six dogs were treated with a mixture of one part of fresh virus and two parts of saline and two with Umeno and Doi's vaccine which had been killed by keeping for one month. Two of the first group died otherwise. After 94 days the surviving animals and six controls were tested with street virus administered intramuscularly. None of the immunized developed rabies (6 months), whilst three out of the six controls developed rabies.

GERBER[53] points out that the prevalence of rabies in the United States is greater than was supposed. For example in 1921 rabies existed in 29 states, and of 5,558 brains examined, 2,699 gave positive results. Also in 1922 it was estimated that 10,000 persons received antirabic treatment. After a discussion of the various methods of control, he states that in the outbreak of rabies in the Dona Ana county in 1925, at least 50 rabid dogs were at large. Approximately 500 dogs were vaccinated and none of this number developed the disease. He draws attention to SCHOENING's experiments on the plurality of strains of street virus (this *Bulletin*, Vol. 23, p. 197).

SCHERN[54] contributes a general article on the control of canine rabies, pleads for compulsory vaccination of dogs, and suggests a system of organization.

MIRRI[55] in a general paper describes the various methods of preventive inoculation, and discusses the influence of plurality of strains.

MELLO and POGGIO[56] advise the employment of 30–75 gm. of a 10 per cent. brain emulsion in 1 per cent. phenol for the treatment of cattle. The dosage should be distributed over a period of 15 days.

FINZI[57] discusses canine vaccination in general, and gives the conclusions of a previous communication (*ante*, p. 227). RAMOS MEJÍA[58] discusses measures of prevention of rabies in Buenos Ayres.

viii. *Miscellaneous.*

KAWATANI[59] has investigated the effect of various disinfectants applied locally at the site of inoculation. The amount of solution used in each case was 100 cc. and this quantity was applied during a period of two minutes. The fluids tested were 1/30 lime sol suspension, 1/10 lactic acid, and 1/10 glacial acetic acid. The interval between inoculation and washing varied in the different experiments. It was found that with fixed virus it was necessary to apply the disinfectant

52 SCHNÜRER (Josef) & DAVID (Hans). Kutane Immunisierung von Hunden gegen Lyssa.—*Berlin. Tierärzt. Woch.* 1927. Apr. 29. Vol. 43. No. 17. pp. 273–274.

53 GERBER (C. W.). The Control of Rabies. *Southwestern Med.* 1926. Nov. Vol. 10. No. 11. pp. 482–485. [5 refs.]

54 SCHERN (Kurt). Betrachtungen ueber die obligatorische Tollwutimpfung der Hunde.—*Berlin. Tierärzt. Woch.* 1927. Mar. 4. Vol. 43. No. 9. pp. 140–142.

55 MIRRI (A.). La profilassi della rabbia e la vaccinazione preventiva dei cani.—*Clin. Vet.* 1927. Feb. Vol. 5. No. 2. pp. 90–93.

56 MELLO (Ugo) & POGGIO (Carlo). La vaccinazione antirabbica dei bovini.—*Ann. d'Igiene.* 1927. Jan. Vol. 37. No. 1. pp. 9–27. [40 refs.]

57 FINZI (Guido). Vaccinazione antirabica dei cani e rabbia da vaccino.—*Clin. Vet.* 1927. May. Year 5. Vol. 50. No. 5. pp. 274–282.

58 RAMOS MEJÍA (C.). Profilaxis de la rabia en la Ciudad de Buenos Aires.—*Semana Méd.* 1927. Feb. 17. Vol. 34. No. 7 (1727). pp. 441–443.

59 KAWATANI (Sanetc). Experimental Studies on the Prevention of Hydrophobia.—*Kitasato Arch. Experim. Med.* 1926. Dec. Vol. 7. No. 1. pp. 61–93. [43 refs.]

earlier than with street virus. The most effective disinfectant was lime sol suspension. In one series of 10 rabbits which had been inoculated on the surface of the cornea with street virus, and which had after a period of 6 hours been subjected to lavage with lime sol, there were eight survivors, whereas in a control group of ten rabbits seven developed rabies. The tests were made in most cases on the surface of the cornea.

BUSSON[60] continues his interesting observations on cross immunity (*ante*, p. 231) between rabies and variola. He finds from experiments on guineapigs that vaccination with variola during the incubation period of rabies has no effect upon the duration of the incubation period.

TAKAYA'S[61] observations on the destructive action of ultra violet rays on virus in vitro (this *Bulletin*, Vol. 24, p. 222) led him to investigate the effect of applying these rays to the infected animal during the incubation of the disease. This treatment proved ineffective. The development of subordinate dispensaries in the outlying districts forms the subject of a communication by V. PUNTONI.[62] The first dispensary was opened at Suzzara in 1923, and in 1925 nine dispensaries were in operation. In all 1,274 cases have been treated, with two deaths (mortality 0·16 per cent., reduced mortality zero).

Lino PUNTONI[63] in a further communication draws attention to the gravity of bites on the terminal phalanges. He cites five cases which have died in spite of treatment, and advises that such cases should be subjected to an intensive course.

FERMI[64] replies to certain statements by V. PUNTONI.

In conclusion the reviewer would draw the attention of all rabies workers to the monograph on Lyssa by LUBINSKI and PRAUSNITZ. (*Ergebnisse der Hygiene, Bakteriologie Immunitätsforschung und Experimentellen Therapie*: part of Vol. viii, Berlin: Julius Springer: 1926.) In this excellent memoir the subject of rabies is brought up to date. The latest researches are described and discussed. The bibliography which covers 20 pages should prove a useful guide.

A. G. McKendrick.

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60 BUSSON (B.). Ueber Wechselwirkung von Vakzine und Lyssa bei Meerschweinchen.—*Wien. Klin. Woch.* 1927. Apr. 7. Vol. 40. No. 14. pp. 449–50. [1 ref.]

61 TAKAYA (K.). Experimentelle Studien ueber die Hundwut. Einfluss und Wert der Ultraviolettenstrahlen auf Hundwutvirus.—*Oriental Jl. Dis. Infants.* 1927. Jan. Vol. 2. No. 1. German summary p. 121. [In Japanese.]

62 PUNTONI (V.). Il dispensario antirabico. Una nuova istituzione di medicina sociale.—*Policlinico.* Sez. Prat. 1927. Mar. 28. Vol. 34. No. 13. pp. 451–454.

63 PUNTONI (Lino). La gravità delle morsicature rabiche alla radice ungueale.—*Ann. d'Igiene.* 1927. Apr. Vol. 37. No. 4. pp. 232–235.

64 FERMI (Cl.). Die antirabische Vakzination und Serovakzination Fermi.—*Seuchenbekämpfung.* 1927. Vol. 4. No. 2. pp. 102–111. [8 refs.]

REVIEWS AND NOTICES.

COMPTE-RENDU DU PREMIER CONGRÈS INTERNATIONAL DU PALUDISME, ROME, 4, 5, 6 OCTOBRE, 1925. [**Report of the First International Congress on Malaria, Rome, 4, 5, 6 October, 1925.**]—345 pp. With numerous text figs. Publié par le Secrétaire Général du Congrès. 1926. Rome: Imprimerie du Sénat du Dr. J. Bardi. [Lit. 100.]

The final publication of this report places in the hands of those interested a great mass of material. The main portions have nearly all been abstracted in this *Bulletin*, having already been published in various journals, but the whole volume forms an essential part of malarial literature. The scope of matters with which it deals is extraordinarily wide. The unicity or otherwise of malaria parasites, studies on general paralysis, complement in malaria, papers on pathological anatomy, Gambusia, Paris green, the house in malaria, blackwater fever. Regarding mosquitoes the possibility of direct transmission of malaria was considered and was negatived; and the suggestion was made that in parts of Mexico anopheles were too scanty to account for the malaria present. Treatment came in for much consideration, possible synthetic formation of the alkaloids of cinchona being particularly dealt with, as well as the therapeutic value of cinchona alkaloids other than quinine. Apart from this, there are a number of papers in the Appendix which are concerned with a yet wider range of malarial subjects. It is proposed to hold the next Congress in 1930 in Algiers to commemorate the centenary of Algeria and the jubilee of the discovery of the parasite of malaria by LAVERAN in that country.

C. L.

MCDONALD (W. Maclachlan). **Collected Papers on Tropical Diseases.** —48 pp. With 5 photographs. 1926. Antigua: Government Printing Office, Leeward Islands.

Dr. Macdonald has collected in this brochure nine papers, seven of which have been published in medical journals. With the exception of a nineteenth century one on ankylostomiasis in Antigua, they date from 1916, and later, and deal with malaria and anti-mosquito measures, pellagra, pulmonary tuberculosis and dysentery. In "Pulmonary Tuberculosis as a Problem of Tropical Medicine" he points out the ease with which this affection may be mistaken for malaria in the tropics, where low fever and absence of cough may characterize each, and notes that the prognosis of pulmonary tuberculosis correctly treated is "infinitely better" in the West Indies than in England. The Governments in the West Indies should provide special facilities for its diagnosis and treatment. He makes the practical suggestion that experiments be carried out in a defined area for the application of various anti-mosquito measures, believing that the increased efficiency of labour which would result would induce the employers to combine in a comprehensive scheme of mosquito reduction.

Dr. Macdonald is a clear writer and the collection of his papers should serve a useful purpose in Antigua where, one gathers, the planters are not enthusiastic hygienists.

A. G. B.

STRICKLAND (C.) [M.A., B.C. (Cantab.), etc.] & CHOUDHURY (K. L.) [M.B., D.P.H. (Cal.), etc.] **An Illustrated Key to the Identification of the Anopheline Larvae of India, Ceylon and Malaya, West of Wallace's Line with Practical Notes on their Collection.** With a Foreword by Sir Ronald Ross, K.C.B., K.C.M.G., F.R.S.—pp. xi 67. With 12 plates. 1927. Calcutta & Simla; Thacker, Spink & Co. [Rs. 4/8.]

This excellent little book, the doctrine of which is that for the medical man and sanitarian the identification of anopheles larvae in the field is a great economy, contains, besides the means of identifying them, a canon and complete ritual of the science and art of manipulating anopheles larvae both in their native element and in the laboratory—of dealing with them as a part of the ordinary routine of a malaria survey. Here the novice in any part of the world may learn all that is needful in the matter of equipment and its usage for the search and capture of the larvae, and all that is methodical for treating the capture and transforming it into a compact and permanent record afterwards. Some may think, perhaps, that the capture of anopheles larvae is a matter too simple for any elaborate detail of instruction; but the reviewer himself has known a man, who was no mean field naturalist, pronounce a piece of water that was fecund in anopheles to be sterile, because he had not learned exactly where to direct his search for the larvae and how to dip for them. Besides all this comprehensive instruction, which is of general value, there is for workers located in the Orient a series of keys—all of simple construction and plainly illustrated by enlarged drawings—by which the larvae of the species of Anopheles inhabiting India and Ceylon and Malaya can be identified severally.

A. Alcock.

MITCHELL (J. Alexander) [M.B., Ch.B. (Glasg.), D.P.H. (Camb.), Secretary for Public Health & Chief Health Officer for the Union of S. Africa], PIRIE (J. H. Harvey) [B.Sc., M.D. (Edin.), F.R.C.P.E., F.R.S.E., Bacteriologist & Pathologist, Research Division of the Institute] & INGRAM (A.) [M.D. (Edin.), Medical Entomologist to the Institute.] **The Plague Problem in South Africa: Historical, Bacteriological and Entomological Studies.**—*Publications of the S. African Inst. for Med. Res.* 1927. Mar. Vol. 3. No. 20. pp. 85–256. With 1 map, 25 figs. on 11 plates & 2 charts.

The authors of this informative and interesting publication give an account of recent investigations into plague in South Africa, and link them to events in the past in such a way as to present a clear picture of the whole problem. The present pandemic spread from Hong Kong in 1894; India was invaded in August 1896 through the port of Bombay; and on 6th February 1899 plague in the Union was first discovered at Middleburg (Transvaal) in the person of an Indian who had journeyed from Bombay. The docks at Capetown became infected during the early part of the year 1901, and henceforth, till 1914, the outbreaks exhibited the usual features of plague as they appear when brought about and spread by domestic rodents. During this period the infection was shipborne to the ports, and thence railborne to inland localities. The preventive measures adopted gave promise of eradicating the infection, but in August 1914 a new phase of the problem appeared in the pneumonic outbreak on the farm "Fairview," in Cape Colony, about 140 miles from Port Elizabeth. Although the later cases in this district were mostly bubonic, signs of an accompanying rodent infection were not manifest. Scattered outbreaks on farms continued to occur throughout the Union in circumstances which

gave no clue to the source of the infection, but in 1920 Mitchell and HAYDON ascertained that the distribution of the outbreaks corresponded roughly with the sandy stretches of veld specially frequented by gerbilles (*Tatera lobengulae*). Evidence of an epizootic in the veld rodents was first obtained at Knysna on the coast of Cape Colony in October 1903, when the striped mice (*Rhabdomys pumilio*) inhabiting the dense woods near the town were shown to be suffering severely from plague. An epizootic of plague among the rats in the town preceded, and indeed was the origin of the outbreak. It is probable that the infection after travelling through the coastal forest belt among the striped mice was passed on by them to the gerbille colonies, and to other associated veld rodents, in the farming country farther inland. In recent years evidence has been accumulating that the epidemiology of human plague here is bound up with the bionomics of the veld rodents and of their carnivore associates—the suricate and yellow mongoose. An epizootic in gerbilles and multimammate mice which was responsible for a fatal case of human plague in February 1921, near Bothaville, furnished the first definite proof incriminating veld rodents. Natural plague has since been found in 11 species of veld rodents and in the yellow mongoose.

The gerbille and the multimammate mouse are the important species for the spread and persistence of plague on the High Veld, with the ground squirrel and, perhaps, the spring hare playing subsidiary parts. In the ower and more bushy country the striped mouse is probably the chief agent; in the Karroo districts the Namaqua gerbille and the Karroo rats are perhaps the main propagators, with hares playing a minor part. Most of the 20 species tested by experiment proved to be acutely susceptible to plague, the exceptions being the Namaqua gerbille and the yellow mongoose. The suggestion is made in the Report that this animal and the suricate, both of them carnivorous species, deserve to be protected rather than destroyed. The cannibalistic habits of the gerbille in nature during a plague epizootic, and the fact that it is readily infected under experimental conditions by feeding, indicate that this mode of transmission may prove to be of considerable importance ; but if this is so the relative importance of infection *per os* as compared with flea transmission cannot be determined until a larger number of spontaneously infected animals have been collected and examined. The evidence obtained so far points to the predominating role of the flea as the transmitting agent in the rodent epizootics. For the persistence of plague in the rodent reservoir the flea is all-important, and experiments that were carried out in rodent-proof and flea-proof runs on the veld, with gerbilles as the experimental animal, showed that in the absence of fleas plague did not persist in the burrows even for one month ; and that when fleas were present the infection persisted abundantly for two months, and to some extent even for three months. These results are certainly significant in explaining how plague may be carried over from one summer to another and over periods when the rodent population is scanty. Four of the species of fleas that infest the wild rodents can imbibe human blood, namely, *Dinopsyllus lypusus* J. and R., *Xenopsylla eridos* Rothsc., *Xenopsylla erilli* Rothsc., and *Chiastopsylla rossi* Watrst., as can also *Xenopsylla brasiliensis* Baker, a parasite of the house-rat. Excepting *Xenopsylla erilli*, these species can apparently transmit plague amongst rodents.

From the year of its introduction in 1899 to 30th June 1926 there have been 2,568 plague cases with 1,505 deaths in South Africa. The area of infected country is now estimated at 100,000 square miles. For the year ending 30th June, 1924, there were 372 cases (235 deaths) in the Union ; all except 6 occurred on farms, and native herdboys were mostly attacked. In the majority of instances the infection was derived from veld rodents with fleas as the intermediary, and in this connexion it is worth noting that since 1912 there has been practically no plague in domestic rodents in South Africa. About 12 per cent. of the cases in the year ending June 1924 were of the pneumonic type; their origin was usually a bubonic case with a lung complication ; infection in many seems to have been conveyed by kissing.

The following conclusions, amongst others, drawn from work on plague vaccines and sera, may be mentioned here :—

(1) Cutivaccination by Besredka's method with a formalin-killed emulsion of plague bacilli has no prophylactic value in gerbilles and multimammate mice.

(2) Sensitized vaccines are of little use for prophylaxis and treatment of plague infection in gerbilles.

(3) Vaccination with a living avirulent culture gives a higher degree of immunity in gerbilles than a killed vaccine.

(4) Antiplague serum gives very good results in the treatment of plague in guineapigs when administered early and in large doses ; the life of the highly susceptible gerbille is prolonged by the use of serum but no actual cures resulted.

(5) Mercurochrome is useless in the treatment of plague in guineapigs.

Attempts were made to discover whether strains of the *B. pestis* from different sources fall into serological groups, but the work done so far does not permit of a final conclusion. There appears to be no essential difference between the South African strains, both human and rodent, and " foreign " strains.

One of the sections of the report deals with a new disease of veld rodents—Tiger River disease. The causative organism was isolated by Dr. J. H. Harvey Pirie and is probably identical with *B. monocytogenes* of E. G. D. MURRAY and his colleagues.*

Included in the report is a table which shows clearly the outbreaks, cases and deaths that have occurred from 1899 to 30th June, 1926, and a map in which the infected and hitherto non-infected areas are shown by means of colours. With the aid of this table and map the main epidemiological data relating to plague in South Africa can be readily understood.

G. F. Petrie.

PINEY (A.). [M.D., Ch.B. (Birm.) ; M.R.C.P. (Lond.), Research Pathologist, Cancer Hospital, London, etc.] **Recent Advances in Haematology.**—pp. viii+276. With 18 text figs. & 4 coloured plates. 1927. London : J. & A. Churchill, 7, Great Marlborough Street. [12s. 6d.]

To write a review of this book is no easy task. It contains much that is of value and the illustrations are excellent. A good deal of technical knowledge is required to appreciate the book and it is not adapted to the needs of the novice. The author has original views on many questions in haematology and evidently the more heterodox and bizarre theories in the literature appeal to him more than those commonly accepted. The expert will find in these pages much to interest him and much to irritate. The author justifiably complains of the difficult style of the late Arthur PAPPENHEIM and of GRUNER, but he loses the lesson conveyed by a parable about a mote and a beam. We cannot follow him in many of his arguments. Thus (p. 77), " the most immature normoblasts have basophilic (immature) cytoplasm, whereas some megaloblasts have eosinophilic (mature) cytoplasm ; it is clearly impossible that a more mature cell can be the immediate ancestor of a less differentiated one." The proposition might be logical if *all* megaloblasts had mature cytoplasm, but is it not possible for a beardless suckling to have a hirsute sire ? We find no reference to the work of MUIR, Noel PATON and GULLAND and a reviewer North of the Tweed may be forgiven a cynical smile in noting that no good thing can come out of Scotland except McGOWAN's poultry.

Alexander Goodall.

*MURRAY, E. G. D., WEBB, R. A. & SWANN, M. B. R. A Disease of Rabbits characterised by a Large Mononuclear Leucocytosis, caused by a Hitherto Undescribed Bacillus *Bacterium monocytogenes* (n. sp.).—*Jl. Path. & Bact.* 1926. Vol. 29. pp. 407–439.